Vol. 27, No. 4 August, 1943

Journal of Applied Psychology

EDITED BY: DONALD G. PATERSON, UNIVERSITY OF MINNESOTA

Consulting Editors

PAUL S. ACHILLES, *Psychological Corporation;* WALTER V. BINGHAM, *A.G.O., War Department;* HAROLD E. BURTT, *Ohio State University;* ARTHUR I. GATES, *T. C. Columbia University;* JOHN G. JENKINS, *University of Maryland;* IRVING LORGE, *T. C. Columbia University;* QUINN MCNEMAR, *Stanford University;* WILLARD C. OLSON, *University of Michigan;* JAMES P. PORTER, *Ohio University;* EDWARD K. STRONG, JR., *Stanford University;* MORRIS S. VITELES, *University of Pennsylvania;* JOSEPH ZUBIN, *N. Y. Psychiatric Institute.*

Table of Contents

Prediction of Achievement in a Radio Training School: A. N. FRANDSEN AND J. M. HADLEY 303

The Relationship Between Clerical Experience and Scores on the Minnesota Vocational Test for Clerical Workers: E. N. HAY AND A. N. BLAKEMORE 311

The Time Factor in the Administration of the Wonderlic Personnel Test: J. H. WRIGHT AND D. M. LAING 316

A Short Form of the Wechsler-Bellevue Test: A. I. RABIN 320

What Are the Personality Traits of the Successful Teacher?: A. F. DODGE ... 325

Changes in Evaluative Attitudes During Four Years of College: S. ARSENIAN 338

A Further Study of the Relation of Time Estimation to Monotony: A. BURTON 350

Some Comments on Dr. Tinker's Review of "Reading as a Visual Task": M. LUCKIESH 360

News and Notes 363

Book Reviews 367

New Books, Monographs, and Pamphlets 373

Published Bi-monthly by The American Psychological Association, Inc.
With the Cooperation of The American Association of Applied Psychology
Prince and Lemon Sts., Lancaster, Pa., and Northwestern University, Evanston, Illinois

Entered as second-class matter, May 7, 1935, at the post office at Athens, Ohio, under the Act of March 3, 1879.
Application for re-entry at the post office at Lancaster, Pa., pending.
Copyright, 1943, by The American Psychological Association, Inc.

PUBLICATIONS OF

THE AMERICAN PSYCHOLOGICAL ASSOCIATION

WILLARD L. VALENTINE, *Business Manager*

PSYCHOLOGICAL REVIEW

HERBERT S. LANGFELD, *Editor*
Princeton University

Contains original contributions only, appears bi-monthly, January, March, May, July, September, and November, the six numbers comprising a volume of about 540 pages.
Subscription: $5.50 (Foreign, $5.75). Single copies, $1.00.

PSYCHOLOGICAL BULLETIN

JOHN E. ANDERSON, *Editor*
University of Minnesota

Contains critical reviews of books and articles, psychological news and notes, university notices, and announcements. Appears monthly (10 issues), the annual volume comprising about 665 pages. Special issues of the BULLETIN consist of general reviews of recent work in some department of psychology.
Subscription: $7.00 (Foreign, $7.25). Single copies, 75c.

JOURNAL OF EXPERIMENTAL PSYCHOLOGY

S. W. FERNBERGER, *Editor, on Leave,* FRANCIS W. IRWIN, *Acting Editor*
University of Pennsylvania

Contains original contributions of an experimental character. Appears monthly (since January, 1937), two volumes per year, each volume of six numbers containing about 520 pages.
Subscription: $14.00 ($7.00 per volume; Foreign, $7.25). Single copies, $1.25.

PSYCHOLOGICAL ABSTRACTS

WALTER S. HUNTER, *Editor*
Brown University

Appears monthly, the twelve numbers and an index supplement making a volume of about 700 pages. The journal is devoted to the publication of non-critical abstracts of the world's literature in psychology and closely related subjects.
Subscription: $7.00 (Foreign, $7.25). Single copies, 75c.

PSYCHOLOGICAL MONOGRAPHS

JOHN F. DASHIELL, *Editor*
University of North Carolina

Consist of longer researches or treatises or collections of laboratory studies which it is important to publish promptly and as units. The price of single numbers varies according to their size. The MONOGRAPHS appear at irregular intervals and are gathered into volumes of about 500 pages.
Subscription: $6.00 per volume (Foreign, $6.30).

JOURNAL OF ABNORMAL AND SOCIAL PSYCHOLOGY

GORDON W. ALLPORT, *Editor*
Harvard University

Appears quarterly, January, April, July, October, the four numbers comprising a volume of 560 pages. The journal contains original contributions in the field of abnormal and social psychology, reviews, notes and news.
Subscription: $5.00 (Foreign, $5.25). Single copies, $1.50.

JOURNAL OF APPLIED PSYCHOLOGY

DONALD G. PATERSON, *Editor*
University of Minnesota

Covers the applications of psychology in business, industry, education, government, etc. Appears bi-monthly, February, April, June, August, October, and December.
Subscription: $6.00. Single copies, $1.25.

Subscriptions, orders, and business communications should be sent to

THE AMERICAN PSYCHOLOGICAL ASSOCIATION, INC.

NORTHWESTERN UNIVERSITY, EVANSTON, ILLINOIS

Journal of Applied Psychology

Vol. 27, No. 4 August, 1943

The Prediction of Achievement in a Radio Training School *

Arden N. Frandsen and John M. Hadley

Utah State Agricultural College

In order to train Navy and Marine recruits as skillful radio technicians with the greatest amount of speed and efficiency, the Department of Naval Personnel found it necessary to supplement the regular training at their radio material schools with five elementary training schools. The Utah State Agricultural College was given a contract to teach the rudiments of radio to the enlisted men who are detailed to the school for a period of twelve weeks in companies of approximately 100 each.

The objective of the training is to prepare these enlisted men to maintain and repair all types of naval and aircraft radio equipment, with special emphasis being placed on radar equipment. The graduates of the elementary schools are selected for further training at one of two advanced schools.

The major divisions of the training program are devoted to instruction in mathematics, electricity and radio theory, and radio laboratory. A description of the purpose and content of each of these courses follows:

Mathematics. The course in mathematics is intended to provide a background adequate for solving practically all ordinary electrical and radio problems. Any student who can perform arithmetical computations readily and accurately is capable of mastering the course. The subject matter includes the following topics: fundamental operations of algebra and their applications in equations; use of the slide rule and the power of ten; Ohm's law as applied to series circuits; special products and factoring; fractions and fractional equations; Ohm's law as applied to parallel circuits; simultaneous equations; trigonometry of the right triangle; and mathematics as applied to motors.

Electricity and radio theory. The instruction is divided into three periods. The first four weeks are devoted to electrical theory and design. The second four weeks are spent in the study of radio theory. The purpose of these first two parts is to explain the principles underlying electrical engineering and electrical engineering apparatus as well as to explain the basic principles of radio theory. The third and last four weeks are devoted to radio, motors, and

* The authors are grateful to Lt. Commander S. R. Stock and to Chief Instructor Edward W. Payne for permission to collect the data here reported. It is to be understood that the study, here reported, is a local research and does not imply navy endorsement. For aid in statistical computations and in formulating a statement of the curriculum, appreciation is expressed to Mrs. Luna Brite and Mr. Glen Bunten, respectively.

generators. The purpose of this section is to develop the principles of alternating currents and alternating current circuits and to show their applications to electrical apparatus fundamental to radio communication.

Radio laboratory. The laboratory is designed to include demonstrations and student participation in job assignments or experiments to be performed individually or in small groups. The experiments progress from simple electrical and mechanical projects through more difficult stages until the student in the last phase of the work constructs a five tube superheterodyne receiver. An attempt is made at all times to coordinate the laboratory work with the discussions being carried on in the theory classes in electricity and mathematics.

Achievement in this curriculum was measured by weekly tests on the content covered in each course. Each question was allotted a number of points depending upon the estimated importance of the question and so that the total number of points for a perfect test paper would be 100. The mean scores on these tests on the different companies were quite near 80. Total achievement scores for each course were obtained by summing the weekly scores and dividing by the number of weeks. An average achievement score for the curriculum was also secured by determining the mean score for the three courses. The reliabilities of the achievement tests were not determined; that the measures are probably reliable, however, is assured and indicated by the careful formulation of significant questions, by preliminary consideration of what constituted satisfactory answers which for later companies were written out and used as scoring keys, and by the consistently high correlations of the scores with certain measures used to predict them.

Since the prognosis of achievement would be very useful in such a curriculum where efficiency of instruction and mastery of the content are highly important, the authors have attempted to determine the predictive value in this curriculum of certain tests. Measures found indicative of achievement could be used in at least three ways: to select the men likely to profit most from the instruction, to section them into classes which might vary in rate of progress and level of mastery of the content, and to help explain instances of failure to attain the desired standards of proficiency.

An examination of the content of the curriculum led to the tentative selection of measures of four characteristics which appeared analogous to those which would be required for successful participation in the training activities, namely, measures of intelligence, mathematics ability, knowledge of electricity, and interest in radio activities. The tests chosen for evaluations as measures of these traits and their reliabilities, all of which appear quite satisfactory, are shown in Table 1.

Descriptions of the tests listed are available in published manuals,[1]

[1] Professional psychologists interested in the names of the specific tests used should communicate with the senior author.

except for the U.S.A.C. Mathematics Ability test and the interest questionnaire. The mathematics test is comprised of 50 problems sampling the basic and most frequently used phases of arithmetic and elementary algebra. The selection of problems was guided by the hypothesis that performance on the common mathematical problems within the experience of every person who has completed high school would measure mathematical abilities independent to some degree of special training. To free further the functions measured from specific memory, rules for many of the processes were supplied. The problems included addition, subtraction, multiplication and division of integers, fractions, decimals, and denominate numbers; the variations on percentage problems; ratio and proportion; solving for one unknown in simple literal linear equations; substitutions in formulae; computing areas of simple geometric figures; determining position of decimal place; conversions of fractions to percentages; and dealing with signed numbers. The interest question-

Table 1

Reliabilities of Tests Used to Predict Radio Achievement of Navy and Marine Recruits

Types of Tests Used	r (odd-even)	r (Sp-Br)
Mental Ability Test	.82	.90
U.S.A.C. Mathematics Ability	.88	.93
Technical Information in Industrial Mathematics	.80	.89
Technical Information in Electricity	.90	.95
Jr. H. S. Electricity Information Test	.75	.86
U.S.A.C. Radio Interest Questionnaire (Not Determined)		

naire consisted of 50 items covering the specific activities in the theory and laboratory courses of the radio curriculum. Such questions as "Do you like to use mathematics in demonstrating electrical laws?" and "Do you like to check a radio set to see if it is working properly?" were rated on a five-division scale from (1) dislike very much to (5) like very much. The interest score was the sum of the ratings on the 50 items. The six different tests, besides covering the four traits we wished to evaluate, permit comparisons for predictive value of two tests each of mathematics and knowledge of electricity.

Selections from these tests were administered at entrance to each of six companies consisting of from 95 to 116 men, who entered the School successively at monthly intervals from March 22, 1942 to August 22, 1942. The tests chosen and the intercorrelations among the sets used for the different companies are presented in Table 2.

The intercorrelations in Table 2 indicate that between intelligence and mathematics, for either test of mathematics, there is considerable

communality, the median r being .615. Between the Tech. Inf. in Indust. Math. and Tech. Inf. in Electricity tests the median r is .56. The corresponding relationship for the U.S.A.C. mathematics and the Jr. H. S. electricity information test is much lower, the median r equals .29. This difference is explained in part by the fact that the Jr. H. S. test was found to be too easy for the men. A moderate correlation exists between intelligence and Tech. Inf. in Electricity, r is .465, and a low

Table 2

Intercorrelations Among the Tests Administered to Companies A to F

Company		r's for measures of Intelligence	Mathematics	Electricity
A	Mental Ability Test		.59	.38
	U.S.A.C. Mathematics			
	Jr. H. S. Elec. Infor.		.25	
B	Mental Ability Test		.73	.22
	U.S.A.C. Mathematics			
	Jr. H. S. Elec. Infor.		.33	
C	Mental Ability Test		.57	.33
	Tech. Inf. in Indust. Math.			
	Tech. Inf. in Electricity		.52	
D	Mental Ability Test		.66	.46
	Tech. Inf. in Indust. Math.			
	Tech. Inf. in Electricity		.63	
	U.S.A.C. Radio Interest	−.05	.03	.15
E	Mental Ability Test		.62	.47
	Tech. Inf. in Indust. Math.			
	Tech. Inf. in Electricity		.56	
	U.S.A.C. Radio Interest	−.13	.06	.28
F	Mental Ability Test			
	U.S.A.C. Mathematics		.61	

correlation, median r is .30, occurs between the intelligence and the Jr. H. S. electricity tests. The correlations show that the interest questionnaire scores are practically independent of each measure of ability, except perhaps for a very slight relationship with knowledge of electricity.

Except for Company A which consisted wholly of sailors, each company included about 70 marines and 30 sailors. Their levels of performance and variability on the measures are shown in Table 3.

Inspection of the table reveals that the first company of men were of superior general ability and that with later companies there was further improved selection according to intelligence. The mean score expected according to the author's norms is 42. Company A's mean is

50.9 which equates to a Gamma IQ of 109. For Company F, the corresponding mean score and IQ are 58.9 and 117. Compared with the mean score of 25.4 on the U.S.A.C. mathematics test earned by 535 freshmen tested when they entered the U.S.A.C. in September, 1942, the radio school subjects are also superior in mathematics ability, and Company F which was superior in intelligence also excels companies A and B in mathematics. On the Tech. Inf. in Indust. Math. test, the mean score of the men in companies C, D, and E are in the ninth decile of the distribution of scores reported by the author for students who had taken 180 hours of instruction. In knowledge of electricity, men in Company C equal the seventh decile and men in Company E equal the sixth decile, compared to the scores of students with 180 hours of instruction reported by the same author. Comparative norms on the Jr. H. S. Electricity Information test and on the U.S.A.C. Radio Interest Questionnaire are

Table 3

Means and Standard Deviations on the Measures for Each Company

Company	N	Mental Ability Test		USAC Math.		Tech. Inf. in Indust. Math.		Jr. H. S. Elect. Infor.		Tech. Inf. in Elect.		USAC Int.	
		Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
A	94	50.9	11.2	34.6	10.0			95.3	6.8				
B	100	53.3	10.6	33.6	11.3			86.7	11.3				
C	100	57.6	10.5			46.0	15.4			84.8	24.8	194.	25.2
D	100	57.0	9.9			42.0	14.3			82.0	24.2	199.	21.8
E	100	56.0	10.1			43.9	14.8			77.0	22.2		
F	116	58.9	9.7	38.9	9.2								

not available. The Jr. H. S. Electricity test, however, proved to be too easy for satisfactory discrimination among our subjects, except to indicate those without appreciable knowledge of electricity. Our mean scores came near the maximum which is 114. Despite the general superiority of the men selected for the training, the standard deviations of the distributions reveal considerable heterogeneity among them. And if scores on the tests mentioned are related to achievement in the radio curriculum, they should be useful in further selection and classification of the men for instruction.

To evaluate the measures as predictive indices, correlations between each measure and achievement in the courses in mathematics, electricity, radio laboratory, and the average of all three were computed. These are presented in Table 4.

The correlations of all tests, except the interest questionnaire, with achievement in each course and with the average of all three are suffi-

Table 4

Correlations Between the Tests and Achievement in the Radio Courses

Company	Tests	Achievement in Mathematics	Achievement in Electricity	Achievement in Radio Lab.	Average
A	Mental Ability Test	.50	.52	.60	.54
	U.S.A.C. Mathematics	.68	.63	.73	.68
	Jr. H. S. Electricity Inf.	.19	.29	.38	.27
B	Mental Ability Test	.61	.51	.40	.56
	U.S.A.C. Mathematics	.82	.71	.54	.77
	Jr. H. S. Electricity Inf.	.25	.63	.69	.60
C	Mental Ability Test	.40	.37	.21	.37
	Tech. Inf. in Indust. Math.	.58	.50	.39	.66
	Tech. Inf. in Electricity	.31	.57	.58	.54
D	Mental Ability Test	.43	.50	.26	.45
	Tech. Inf. in Indust. Math.	.72	.65	.46	.69
	Tech. Inf. in Electricity	.44	.60	.55	.56
	U.S.A.C. Radio Interest	.05	.11	.03	.07
E	Mental Ability Test	.41	.32	.20	.39
	Tech. Inf. in Indust. Math.	.69	.52	.41	.66
	Tech. Inf. in Electricity	.50	.51	.59	.60
	U.S.A.C. Radio Interest	.08	.17	.30	.19
F	Mental Ability Test	.50	.43	.34	.47
	U.S.A.C. Mathematics	.73	.65	.47	.68
Median *r*'s, all companies	Mental Ability Test	.46	.46	.30	.46
	U.S.A.C. Mathematics	.73	.65	.54	.68
	Tech. Inf. in Indust. Math.	.69	.52	.46	.66
	Tech. Inf. in Electricity	.44	.57	.58	.56
	Jr. H. S. Elec. Inf.	.22	.43	.53	.43
	U.S.A.C. Radio Interest	.06	.14	.16	.13

ciently high to justify their use in selecting and in sectioning men for training in the radio curriculum, and as aids in explaining instances of failure to succeed. To compare the measures for predictive significance, perhaps the median *r*'s for the different companies will be most useful. The best single test is the U.S.A.C. Mathematics test; for it the median correlations with mathematics, electricity, and average achievement are higher than for any other single test. The corresponding correlations for the Tech. Inf. in Industrial Mathematics Test are only slightly lower, however. Except for Company A where the Jr. H. S. electricity test is less closely related to achievement, the mental ability test is the measure of ability having least predictive value for this curriculum. Both the Tech. Inf. in Indust. Mathematics and electricity tests are

good indices of achievement, especially in the specific fields to which each is directly related and also in predicting average radio achievement. For the latter purpose, the mathematics test is superior.

The relatively high correlations in Company B and the very low correlations in Company A for the Jr. H. S. electricity test are perhaps explained by the differences in the means and standard deviations of the two companies on this test. All the men in Company A, being Navy recruits, had had some experience in electricity and for them the test was too easy to be discriminative. In Company B, some men had had little or no experience or training in electricity and the test apparently does distinguish between these men and those with some knowledge of the subject.

Paradoxically, although as might have been expected from the results of other studies between the interest questionnaire and achievement, the correlations indicate practically no relationship. It is still possible, however, that in individual cases interest might have been a significant factor affecting achievement, and it might be an important factor determining job satisfaction. Despite the very low correlation between the interest scores and achievement, the mean interest scores of those who failed to meet the minimum achievement standards for continuing to completion of the course was only 183.04 as compared with 200.25 for those who graduated and 208.00 for some who were permitted to repeat the course. That these differences in means are statistically significant is evidenced by critical ratios of 4.13 and 3.98 respectively.

A further evaluation of the tests may be obtained by computing the multiple correlations between the predictive indices and achievement. These multiple R's for selected combinations of the measures and average achievement are given in Table 5.

Inspection of the zero order coefficients of correlation in Table 4

Table 5

Multiple correlations for: (1) average achievement with (2) Mental Ability Test, (3) mathematics (a—U.S.A.C. or b—Tech. Inf. in Indust. Math., (4) electricity (c—Jr. H. S. Inf. or d—Tech. Inf. in Electricity) and (5) U.S.A.C. Radio Interest.

Combinations	Companies						Median
	A	B	C	D	E	F	R's
R 1.23	.70a*	.76a	.66b	.71b	.66b	.68a	.69
R 1.24	.54c	.86c	.55d	.59d	.61d	—	.59
R 1.34	.68ac	.85ac	.70bd	.71bd	.71bd	—	.71
R 1.234	.70ac	.85ac	.71bd	.71bd	.72bd	—	.71
R 1.2345	—	—	—	.71bd	.72bd	—	.715

* The letters refer to the different mathematics and/or electricity tests.

revealed that the best single index of potential achievement is the U.S.A.C. mathematics test for which the median correlation with average achievement is .68. Table 5 shows that appropriate combinations of the different measures will improve the predictions somewhat. The data for Company B indicate that to combine the U.S.A.C. mathematics test with either the intelligence test or the electricity test results in multiple R's of .86 or .85, unusually high predictive relationships. The addition of variables beyond two, however, does not increase the precision of the predictions. Considering the data for all the companies together as reflected in the median multiple R's, a procedure which involves comparing different tests of mathematics and electricity, it would appear that the most efficient and economical combination of tests for predicting average achievement in the radio curriculum is comprised of mathematics and electricity. The median multiple R for this team is .71. Although our data did not include the particular combination in multiple correlation, the zero order coefficients indicate that the best combination would consist of the U.S.A.C. mathematics test and the Tech. Inf. in Electricity Test. To add intelligence and/or interest does not improve the accuracy of the prediction.

Conclusion

To predict achievement in a curriculum consisting of mathematics, electricity and radio theory, and radio laboratory studied by Navy and Marine recruits as preparation for entrance into a school for training skillful radio technicians, six measures have been evaluated.

Ranked in order of their degree of correlation with average achievement in the curriculum, the measures are (1) U.S.A.C. Mathematics Ability, r equals .68; (2) Technical Information in Industrial Mathematics, r equals .66; (3) Technical Information in Electricity, r equals .56; (4) Mental Ability Test, Gamma C, r equals .46; (5) Junior High School Information Test in Electricity, r equals .43; and (6) the U.S.A.C. Radio Interest Test, r equals .13.

The most efficient and economical combination of tests in a multiple regression equation for predicting average achievement would be comprised of either one of the mathematics tests and the Technical Information in Electricity Test. To add the intelligence test and/or interest questionnaire would not improve the precision of the prediction.

Received February 25, 1943.

The Relationship Between Clerical Experience and Scores on the Minnesota Vocational Test for Clerical Workers

Edward N. Hay and Arline M. Blakemore

The Pennsylvania Company, Philadelphia, Pa.

We have sought to learn whether there is a significant difference in performance on the Minnesota Vocational Test for Clerical Workers between experienced and inexperienced clerks. We compared the Minnesota test scores of more than 200 women applicants for clerical work who had had no previous clerical experience with those of a like number of women applicants who had had at least one year of clerical experience prior to taking the test.

The Subjects

The subjects were all women applicants for clerical work at the Pennsylvania Company, a large Philadelphia bank. Applicants are tested in a specially equipped testing room under conditions as nearly uniform as it is possible to make them. Included as subjects for this study were all women clerical applicants tested between April 1, 1941 and May 26, 1942 who met the following criteria.

Classification Criteria

To be classified as experienced, the applicant must have had at least one year of clerical experience ending not more than six months prior to taking the test. The length of experience varied from 1 to 20 years. The average time was 5 years. The types of jobs held by girls included in this group were: secretary, bookkeeper, typist, clerk, general office worker, multigraph operator, etc. The data on experience was taken from an application card filled out by the subject prior to being interviewed or tested. In a few cases information about experience was not available and these cases were, of course, omitted. We omitted also any applicant who had some clerical experience, but had not had as much as one year. Since we wished to study the influence of intelligence also, we excluded any applicant who had not been given the Otis Self-Administering Test of Mental Ability, Higher Examination: Form B which we give with a 20 minute time limit. The intelligence test is administered before the Minnesota Clerical Test is given.

Those included in the inexperienced group must have had no clerical experience and must also have taken the Otis Self-Administering Test of

Mental Ability with us. We did not classify as clerical such work as selling and soda dispensing in which some of the girls classed as inexperienced had held jobs. However, the large majority of the inexperienced group had had no work experience.

Results and Discussion

The difference between the mean Minnesota numbers score for the experienced and inexperienced groups is 7.5 points in favor of the experienced group. The critical ratio based on the standard error of the difference is 3.4. This indicates virtual certainty that the difference between the two groups is a true difference and not due to chance variation of the mean.

Table 1

Frequency Distributions

	Minnesota Numbers		Minnesota Names	
	Experienced Group	Inexperienced Group	Experienced Group	Inexperienced Group
190–199	1		1	1
180–189	4	2	9	2
170–179	5	3	5	8
160–169	8	5	22	11
150–159	30	9	22	16
140–149	26	25	28	28
130–139	26	27	45	31
120–129	42	33	43	32
110–119	39	48	22	27
100–109	28	38	20	30
90–99	20	17	9	22
80–89	7	14	9	15
70–79	5	3	4	3
60–69		4	2	2
50–59		1		1
N	241	229	241	229
M	126.5	119.0	132.1	124.1
σ	24.2	23.0	25.5	26.1

The difference between the mean Minnesota names score of the experienced and inexperienced groups is 8.0 points in favor of the experienced group. The critical ratio based on the standard error of the difference is 3.4. Again this indicates that there is a true difference in performance on the Minnesota Vocational Test for Clerical Workers between women clerical applicants who have had prior clerical experience and those who have had no such experience.

In selecting employees we have used 130 as an elastic critical score on the Minnesota. On the numbers part of the test 41% of the experienced applicants scored 130 or higher, while 31% of the inexperienced group scored 130 or higher. On the names part of the test, 54% of the experienced applicants scored 130 or higher, while 42% of the inexperienced group scored 130 or higher.

Our findings indicate that Minnesota clerical scores of completely inexperienced applicants should not be compared directly with scores of those who have had a year or more of clerical experience. However, the effect of experience seems to stop there. There is practically no correlation between length of experience and Minnesota numbers score for the group of 241 applicants who had had at least one year of clerical experience prior to taking the test. The coefficient of correlation between Minnesota numbers scores and length of experience is $-.06 \pm .04$; the *eta* giving regression of numbers scores on length of experience is $.10 \pm .04$; the range of experience is from 1 to 20 years; the average, 5 years.

Other Factors

In order to investigate other factors than experience which might have produced the differences between performance of the experienced and the inexperienced groups, we first compared the two groups on intelligence. The mean score of the experienced group on the Otis Self-Administering Test of Mental Ability, Higher Examination: Form B (20 minutes) is 36; the sigma 12 points. For the group without previous clerical experience the mean Otis score is 39, the sigma 12 points. The superiority of the experienced group in Minnesota Clerical Test scores cannot thus be linked to a superiority in intelligence. Moreover, the correlation between Minnesota numbers scores and Otis scores computed for the 229 inexperienced girls is $+.23 \pm .04$. The correlation between intelligence and names computed for 200 inexperienced girls is $+.50 \pm .04$. These figures approximate closely those reported on various occasions by Andrew and Paterson.[1]

Nor does the factor of age seem responsible for the difference in Minnesota numbers scores between the experienced and the inexperienced groups. There is a difference of about 7 years between the mean ages of the two groups, as would be expected, but there is little correlation within either group between age and Minnesota numbers scores. In a representative group of 101 inexperienced clerical applicants, the age range is from 16 to 26; the mean age, about 18 years. The correlation between

[1] Andrew, Dorothy M., and Paterson, Donald G. Measured characteristics of clerical workers. Minneapolis: University of Minnesota Press, 1934. Andrew, Dorothy M. An Analysis of the Minnesota Vocational Test for Clerical Workers. *J. appl. Psychol.*, 1937, 21, 18–47.

age and Minnesota numbers score is $-.06 \pm .07$. *Eta* giving the regression of numbers score on age is $.21 \pm .06$. Among 241 experienced clerks, 239 fall within the age range 18 to 38 years. Their mean age is 25 years. The correlation between Minnesota Clerical Test numbers and age is $-.08 \pm .07$. *Eta* giving the regression of number scores on age is $.22 \pm .04$. Thus, neither age nor intelligence differences seem to explain the differences between performance of experienced and inexperienced applicants on the Minnesota Clerical Test.

The material was readily available with which to investigate the effect of commercial training upon clerical scores. Since there is a significant correlation between the names part of the Minnesota clerical test and intelligence and a negligible correlation between intelligence and the numbers part of the test, it was decided to use the numbers scores only in the investigation of the effect of training. The sample of inexperienced girls was divided into two groups, those who had had the academic course in high school and college, and those who had had commercial training in high school or business school training. The mean Minnesota numbers score for 101 inexperienced girls with commercial training is 117.8; the sigma, 22.2. The mean Minnesota numbers score for 93 inexperienced girls without commercial training is 118.4; the sigma, 24.7. This seems to corroborate the conclusions drawn from a test-retest study made by the authors of the Minnesota test namely, that commercial training does not affect the Minnesota clerical test scores.[2]

The difference between what may be called a high and a low score on the Minnesota clerical test is, of course, much larger than the 7 point difference found between the means of the experienced and inexperienced groups. That is, individual differences are greater than group differences. However, where a critical score on the Minnesota is used in employee selection, disregarding this group difference might result in turning down inexperienced applicants who have at least as much clerical aptitude as some experienced applicants who score just above the critical score limit and are accepted.

If we accept the difference between experienced and inexperienced clerical applicants in their performance on the Minnesota, the question of cause for the difference arises. Is the difference due to learning habits on the job which lead to higher Minnesota scores, or is a selective process at work which screens out over the course of a year's experience those of lesser clerical ability? We expect to investigate this question by comparing scores of test and retest after one year for a group of clerical workers experienced prior to taking the first Minnesota with the same results for a group without clerical experience prior to taking the first

[2] Andrew, Dorothy, and Paterson, Donald G., *op. cit.*, p. 18.

Minnesota. At present, we have not enough cases to constitute conclusive evidence, but the few we have point toward a learning process as the cause of the difference.

Summary

On the Minnesota Vocational Test for Clerical Workers, we have found a significant difference of about 7 points, favoring the experienced group, between the mean scores of a group of 229 inexperienced women applicants for clerical work compared with a group of 241 women applicants who had had a year or more of clerical experience prior to taking the test. We found no indication that differences in age, intelligence, or school training are responsible for the differences in Minnesota clerical scores.

The Time Factor in the Administration of the Wonderlic Personnel Test

James H. Wright and Donald M. Laing

Industrial Relations Department, Carnegie-Illinois Steel Corporation, Gary Sheet and Tin Mills

The use of a test battery to aid in the personnel placement interview is finding increased favor with business and industry. It is generally agreed that well chosen test batteries materially aid in good placement. However, they have added to the time allotted to the interview with a resultant rise in costs both for the company and the prospective employee. In the interest of economy, it is desirable that this time limit be held to the minimum that is commensurate with good placement.

At a recent session of the American Management Association's Personnel Section, the statement was made, during a panel discussion of testing, that the time limit for the Wonderlic Personnel Test should be ignored inasmuch as the average individual was likely to be penalized by the time interval.

It is the thesis of this paper that any extension of time beyond that set by the author of this test will not change the relative rank of the applicant. If this thesis be true, then it is uneconomical to allow additional time inasmuch as occupational norms may be set up on any time interval desired.

To investigate this problem, the authors made it a policy to administer to all applicants for employment or transfer in a typical industrial plant, the Wonderlic Personnel Test on a two-time interval. The standard administration procedure was followed. At the end of 12 minutes note was made of the questions answered and the applicant was then given 12 additional minutes in which to complete as much of the remainder of the test as possible.

Ninety-seven men and 92 women were given the test by this method. Of these, 118 were applying for work, while 71 were employees seeking transfer to better jobs. There was considerable variation in qualifications and experience among this group. One hundred forty-one were qualified for some kind of office work—typing, comptometry, key punch, stenography, or general clerical work; 14 were seeking miscellaneous jobs; while 34 were employed as machinist helpers. This group ranged in age from 18 to 57, the median being 20 and the mean, 25. Educational

qualifications ranged from 4 to 17 years of schooling, with the average individual having completed high school. More specifically, 11% had from a fourth to an eighth grade education; 11% from a 9th to an 11th grade education; 60.3% completed high school; and 17.4% had from 1 to 5 years of college. It can be seen that the sample used in this study is fairly heterogeneous and was representative of the general run of industrial applicants.

Two scores were obtained from the tests—one for the 12 minute and one for the 24 minute administration. Pearsonian coefficients of correlation[1] were computed for the three forms of the test with the results as shown in Table 1. It will be noted that the obtained correlations are of a high order and the probable error of r indicates that the relationship found cannot be ascribed to chance. Assuming that the three forms of

Table 1

Correlation Between 12′ and 24′ Scores of the Wonderlic Personnel Test

Form	N	r	σ_r
D	61	.947	.013
E	72	.943	.013
F	56	.923	.02
All	189	.944	.008

the tests were comparable, the results were pooled and the correlation regardless of form was found to be .944 ± .008.

As another check of the relationship existing between scores on the two time limits, the scores for the three forms were grouped according to raw score on the 12 minute administration. This resulted in thirty-three groups which were then treated by the method of least squares to determine the line of best fit.[2] The resulting equation of $Y = 1.75 \pm 1.09X$ was obtained with a standard error of estimate of 1.05. Again the consistency of rank is established with a small margin of error. As one more check, the coefficient of correlation was computed from the grouped data and found to be .984 indicating an 82.2% reduction in errors of prediction.

Previous to this study an investigation had been made of the reliability of the three forms of this test as shown by a group of people who had taken the test as a part of their placement interview. Table 2 shows the Spearman-Brown reliability of these forms as determined by the split-half method;[3] the standard error of the reliability and the standard

[1] Guilford, J. P. *Psychometric methods.* New York: McGraw-Hill Book Company, Inc., 1936, p. 327.

[2] *Ibid.*, p. 297.

Table 2

Reliability of the Wonderlic Personnel Test

Form	N	r_{211}	σ_{r211}	$\sigma_{(M)}$
D	318	.874	.0075	3.5
E	88	.70	.0376	2.79
F	116	.809	.0196	2.64

errors of measurement are also indicated. E. F. Wonderlic [4] reports the reliabilities of these tests as ranging from .83 to .92 when one form is correlated against another form. The corrected correlation of odd-even items is reported to give a reliability of .88 to .94 and the probable errors are said to range from 1.3 to 1.6. It will be noted that these results are in disagreement with the results reported in this paper. The reliability of this test varies with the different forms and is not as high as might be desired.

Table 3 shows the average increase in score for the 12 minute and 24 minute administrations of the three test forms and for the combined

Table 3

Significance of Increase in Score in Lengthened Test

Form	Mean	Diff.	$\sigma_{dist.}$	σ_M	Diff.	CR
D 24′	24.14	3.40	8.40	1.08	.374	9.1
12′	20.74		6.92	.89		
E 24′	26.26	3.72	10.06	1.19	.529	7.03
12′	22.54		6.62	.78		
F 24′	26.94	4.48	7.80	1.04	.400	11.2
12′	22.46		7.33	.98		
All 24′	25.70	3.80	8.06	.59	.202	13.01
12′	21.90		6.97	.513		

total. While this increase is small numerically, yet statistically it is very significant. However, when the increase is interpreted in terms of the norms issued by the author, it does not appear to be so significant. Moreover, when compared with the standard error of measurement of the test (see Table 2), it will be noticed that in most cases the increase is not much greater than the standard error of measurement.

[3] *Ibid.*, p. 418.

[4] Wonderlic, E. F. Personnel Test Manual. E. F. Wonderlic, 919 N. Michigan Ave., Chicago, Illinois. This manual is issued as an instruction pamphlet to accompany the tests.

The results of this study indicate that for the population concerned and for similar populations, the use of a longer time interval in the Wonderlic Personnel Test would result in a small increase in the obtained raw score. However, there is practically no change in rank from the use of the test in this manner. Since personnel men are concerned with an individual's capacity as related to pre-established norms, it would not appear economical to lengthen the administration of a test beyond that point at which it is effective. While this problem is subject to further investigation, yet the conclusion appears evident that within the known reliabilities of the test itself, a time limit of 12 minutes is sufficient to determine with a fair degree of reliability the mental alertness of the applicant.

A Short Form of the Wechsler-Bellevue Test *

Albert I. Rabin

New Hampshire State Hospital

In these days of numerous attempts to classify correctly and suitably the available resources of manpower, the task of measuring and estimating mental capacities is gigantic if not staggering. The necessity of arriving at quick and reasonably adequate judgments regarding the individual's capacities becomes imperative.

After working for a period of several years with the Wechsler-Bellevue (6) Scales, with normals as well as with mental patients, it became apparent that some sub-tests tend to reveal the trend of the general mental level much more readily than others. This was purely a clinical observation, without the benefit of the application of factor analysis which was of considerable use to Balinsky (1) in his studies of the various age groups. In other words, the present study is an outgrowth of clinical and empirical data.

Materials

The Bellevue Scales consist of the following ten sub-tests: (1) Information, (2) Comprehension, (3) Arithmetic, (4) Digits, (5) Similarities, (6) Picture Completion, (7) Picture Arrangement, (8) Object Assembly, (9) Block Design, (10) Digit Symbol.

The choice of sub-tests for a briefer form had to be governed by an additional practical consideration, apart from their apparent correlations with the general mental level. The ease and readiness of administration and elimination of cumbersome test materials were of importance. Consequently, verbal sub-tests only, which can be easily memorized, were selected. The tests are: (1) Comprehension, (2) Arithmetic, (3) Similarities.

The test records of two groups were examined and the data correlated. The first group consisted of 92 student nurses (female) ranging in age from 19 to 25. The I.Q. range is from 85 to 130.

A second group, which was to be used as a check on the first one, was taken from the N. H. State Hospital files. This group consists of the records of 200 patients whose examinations were satisfactory. The records were taken at random, the only controlling factor being the age

* The assistance of H. Samuels and A. Weider in the completion of this study is gratefully acknowledged.

of the patients, ranging from 15 to 36. Most of the records were of psychotic individuals (chiefly schizophrenia and manic-depressive psychosis) while a considerable percentage was diagnosed either "psychoneurotic" or "without psychosis." One hundred and twenty-eight males and 72 female patients made up this group. It is quite obvious that this group is of a much more heterogeneous character than the first one. Moreover, the I.Q. range was considerably wider, from 39 to 122.

Statement of Results

Table 1 shows the correlations of the combined weighted scores of the above-mentioned three sub-tests,—comprehension, arithmetic and similarities (C.A.S.) with the Total Bellevue scale scores for the 92 nurses. The combined weighted scores of the 3 sub-tests were also correlated with the verbal and performance scale scores. Another test, the Alpha, is also added for further validation of the results.

Table 1

C.A.S. Combined Scores Correlated with Other Tests

N = 92	Total Wechsler	Wechs.-Bell. Verbal Score	Wechs.-Bell. Perf. Score	Army Alpha Form 5
C.A.S.....	.80	.88	.51	.70

The findings were quite encouraging, since the coefficients of correlation approach the magnitude ordinarily expected in a comparison of two different intelligence tests. Moreover, when the Full Scale Wechsler was correlated with the Alpha scores of the same group, the coefficient of correlation was .74, which is not much higher than the $r = .70$ between the C.A.S. combined score and the Army Alpha.

However, in order to check our results further, and in an attempt to construct a more reliable instrument, applicable to our Hospital population and in agreement with Kent's idea on "Self-Derived Norms for Institutions" (3), the records of the 200 patients, which constitute the second group, were carefully examined. The obtained results on this randomly chosen group of a wider range of ages and intelligence levels and of differing degrees of mental instability, were even more in agreement with the original idea of the short form of the Bellevue.

Table 2 gives the coefficients of correlation between the scores of the short form (C.A.S.) and the total Bellevue scores as well as the subscores (verbal and performance) of the same scale. It is quite obvious that the correlation of the weighted scores is very high and even much higher than with the smaller, more homogeneous group of nurses.

It was thought advisable, however, to obtain I.Q.'s based on the

Table 2

C.A.S. Correlated with the Full Bellevue Scale and its Subdivisions

N = 200	Wechs.-Bell. Perf. Score	Wechs.-Bell. Verbal Score	Wechs.-Bell. Total Score	Wechs.-Bell. (Total Score) Minus C.A.S.
C.A.S. score.....	.759	.952	.956	.809

short form and check them against the I.Q.'s obtained with the Full Scale. The most logical procedure to be followed was the use of a newly computed score based on the C.A.S. score and comparable with the full scale score which is convertible into an I.Q. by the use of Wechsler's tables (6, p. 224–244). This was done in full recognition of the fact that, especially in pathological cases, not all sub-tests participate equally in the achievement of the full scale score (4, 5). Equal participation is an ideal which does not hold in normal cases either (5). Since the three chosen tests are part of a scale of ten sub-tests, the formula applied in order to obtain the "total score" is simply as follows: $X = \frac{\text{C.A.S.}}{3} \times 10$. X is the score to be obtained and C.A.S. is the total weighted score of the three sub-tests chosen for the short form.

After the "total scores" were computed in this manner, the I.Q. of each case was obtained from the proper age column in Wechsler's tables. When the "obtained" I.Q.'s of the 200 cases were correlated with the actual I.Q.'s originally computed on the basis of a full Wechsler-Bellevue examination, in the ordinary fashion, a coefficient of .93 was the result. This is as high a correlation as any reported, between the Bellevue test and other tests of intelligence. Benton and co-workers (2) report a correlation of +.93 between the Stanford-Binet (Form L) and full score of the Bellevue. Wechsler reported the correlation of Binet and Bellevue I.Q.'s for a group of 75 children (ages 14–16) as +.82. He also quotes Fishbein's results with a group of college students: $r = .57 \pm .04$ (6, p. 131). Moreover, the test-retest correlations given by Wechsler (6, p. 135) for two small groups of children and adults are .94, in both cases, which only slightly exceed the correlation between the short form and full scale.

It appears, therefore, on the basis of our statistical findings, that the "short form" I.Q.'s can be the best (and quickest) indicators of a Bellevue I.Q. It is also to be borne in mind that it shows a fairly high correlation with the Alpha as well.

In Table 3, additional data, comparing the short form and the full Wechsler-Bellevue Scale results, are presented.

From this table it can be readily seen that the I.Q. range of the Short Form is somewhat larger, especially at the upper end of the scale where

Table 3

Comparison of Obtained I.Q.'s with Actual I.Q.'s

N = 200	Range	Mean	Mdn.	S.D.
Actual I.Q.	39–122	90.71	91.79	19.20
Obtained I.Q.	31–133	89.03	90.82	23.05

the Bellevue admittedly shows a comparatively poor differentiating capacity. The means, medians, and standard deviations of the distributions are quite similar and the average difference between the I.Q.'s is also rather small and is not statistically significant. The range of differences between individual pairs of I.Q.'s is fairly wide. Further check, however, indicates that in the majority of cases the basic psychometric classification of intelligence remains unaltered.

Discussion

The Shorter Form of the Wechsler-Bellevue, proposed in this paper, has many advantages from the point of view of speed of administration and accuracy of results. However, its limitations should also be pointed out.

In the first place, it is primarily a verbal test, which is, therefore, not universally applicable. Only individuals with an English language background may be satisfactorily tested by it.

Secondly, the population showing the high degree of correlation is in some respects a selected one. The similarity of the cultural background of the subjects as well as the similarity of the regional educational opportunities may favor the representativeness of the chosen sub-tests. Further verification on different groups of subjects would be advisable.

The third limitation is inherent in all abbreviated scales; it is the limitation of the range of the examinee's expression and the examiner's observation. A larger variety of tasks is needed to fulfill the desiderata lastly mentioned. The Full Scale should, therefore, be used if a more thorough clinical tool is needed and if sufficient time for it is available.

It may also be well to summarize briefly the advantages involved.

Firstly, it takes about 30% of the total time needed for a Full Scale Bellevue, to administer and score the shorter form.

Secondly, the shorter form inherits an advantage which is the main distinctive feature of the Bellevue Scales, *i.e.*, it takes the subject's age into consideration. After the raw scores for the three sub-tests which make up the short form are obtained, they are converted into weighted scores, using Wechsler's table. Then, the total scale score is computed

(Formula: $X = \frac{\text{C.A.S.}}{3} \times 10$) and the I.Q. is looked up in the proper age column.

Finally, it was shown above that the abbreviated scale correlates with the Full Scale as highly as any other test employed in the several correlational studies mentioned before.

Summary

Clinical experience and observation reveals that three verbal sub-tests of the Wechsler-Bellevue Intelligence Scales are indicative of the general mental level of the testees determined by the Full Scale. The combined score of the three chosen sub-tests (Comprehension, Arithmetic and Similarities) is a reliable and quick method in intelligence testing as shown by the statistical data presented on 92 normal nurses and 200 hospitalized individuals.

The steps involved in determining the I.Q. on the basis of the proposed Short Form of the Wechsler-Bellevue Scales are as follows:

1. Administer the three selected sub-tests in the ordinary manner, according to Wechsler's instructions.
2. Obtain the raw scores (Wechsler's Scoring Standards).
3. Convert raw scores into weighted scores.
4. Add weighted scores and compute "total score" by the formula, $X = \frac{\text{C.A.S.}}{3} \times 10$.
5. Obtain I.Q. from the tables for the various age groups by using obtained (computed) "total score."

References

1. Balinsky, B. An analysis of the mental factors of various age groups from nine to sixty. *Genet. Psychol. Monogr.*, 1941, **23**, 191–234.
2. Benton, A. L., Weider, A., and Blauvelt, J. Performances of adult patients on the Bellevue Intelligence Scales and on the Revised Stanford-Binet. *Psychiat. Quart.*, 1941, **15**, 802–806.
3. Kent, G. Self derived norms for institutions. *Psychol. Rec.*, 1939, **3**, 195–208.
4. Rabin, A. I. Test score patterns in schizophrenia and non-psychotic states. *J. of Psychol.*, 1941, **12**, 91–100.
5. Rabin, A. I. Differentiating psychometric patterns in schizophrenia and manic-depressive psychosis. *J. of Abn. & Soc. Psychol.*, 1942, **37**, 270–272.
6. Wechsler, D. *The measurement of adult intelligence* (Second Ed.). Baltimore: The Williams & Wilkins Co., 1941.

What Are the Personality Traits of the Successful Teacher?

Arthur F. Dodge

University of Illinois

There are two ways of studying the characteristics of successful workers in any occupational field. One is to measure the characteristics of successful workers in a given field and then compare the characteristics of this particular occupational group with the characteristics of a random sampling from the general adult population. The norms of the Strong Vocational Interest Blank were secured in this way.

A second possible method is to compare the characteristics of successful workers in a given field with the characteristics of less successful workers in the same field. This method was used by the writer in studying the personality traits of successful sales people and clerical workers.[1]

For purposes of vocational selection and guidance, we wish to know the characteristics which distinguish the successful from the unsuccessful worker in a particular field and it would seem that the best way to learn these characteristics is by a direct comparison of successful and unsuccessful workers in that field. A comparison of successful workers in one field with a random selection from the general adult population will, of course, determine traits and attitudes characteristic of that occupation. But such traits and attitudes may be characteristic of both successful and unsuccessful workers in that field, due to common influences experienced in the occupation or in preparation for the occupation. Traits and attitudes characteristic of both the successful and unsuccessful worker in a given field are certainly valueless for predicting success in that field.

For the above reasons the writer considers a comparison of successful and unsuccessful workers in a given field as the more valid method of determining the traits and attitudes characteristic of success in that occupation. However, there are difficulties in this method. First, it is difficult to find reliable measures of success and second, it is difficult to find a sufficient number of unsuccessful workers. Unsuccessful workers are rapidly weeded out of any occupation with the result that one is forced to make a comparison between more successful and less successful workers rather than between the successful and the unsuccessful. However, even under these difficulties, it is believed that the results are more

[1] Dodge, Arthur F. What are the personality traits of the successful sales-person? *J. appl. Psychol.*, 1938, 22, 132–139, and Dodge, Arthur F. What are the personality traits of the successful clerical worker? *J. appl. Psychol.*, 1940, 24, 576–586.

valid for guidance and selection than when a comparison is made between workers in the field and the general adult population.

The study of the traits of successful teachers was undertaken by the writer because he happened to be associated with a large group of teachers with extreme differences in ability. Also, the writer was fortunate in securing the full cooperation of the supervisors of this group in providing ratings of teaching ability.

Procedure Followed in Securing Data

This group of teachers comprised the teaching staff of an air corps technical school and numbered about 1000. This staff was divided into twelve different divisions of approximately equal size with a supervisor in charge of each division. At the request of the writer, each of the twelve division supervisors selected approximately ten of his best and ten of his poorest teachers and these individuals filled out a personality inventory.[2]

Later two other teacher groups were included in the study: a group of 47 apprentice teachers of agriculture and a group of fifteen apprentice home economics teachers, both groups in the last semester of their senior year at the University of Illinois. Both of these groups were rated on their success in their apprentice teaching and all also filled out the personality inventory mentioned above. In judging teaching success supervisors were requested to think in terms of resultant student learning in line with the aims of the course taught. Some readers may feel that this is a rather indefinite statement and bound to be interpreted differently by different supervisors, but the writer hesitated to attempt to set up a more objective measure of teaching success which would necessarily enforce conformity upon supervisors. Until there is more general agreement among educators as to what comprises successful teaching, there would seem to be no reason for believing that such a formal objective measure would be any more valid.

The entire group included in the study numbered 301: 239 from the air corps technical school, 47 apprentice teachers of agriculture, and 15 apprentice teachers of home economics. On the basis of ratings for success in teaching, the entire group was divided into two groups: 168, who had been rated by their supervisors as better instructors and 133 who had been rated as less successful. An item analysis was then made of the personality inventory to determine those items for which the responses of the better instructors tended to differ from the responses of the poorer instructors.

[2] *Occupational personality inventory form S-C*, by Dodge, Arthur F.

Personality Traits of Successful Teachers

As a result of this analysis, 43 items were found which seemed to differentiate between the successful and less successful teachers. An attempt was then made to classify these 43 items by grouping together any items which seemed to indicate a similar attitude or habit of action. Five different groupings or classifications were made which the writer has attempted to name and has hereafter designated as "traits." Each "trait" represents an attitude or habit of action which the better teachers report themselves as possessing more frequently than do the less successful teachers. It was found that the better teachers reported themselves as social or at ease in social contacts, more frequently than did the less successful teachers, also the more successful teachers more frequently reported themselves as willing to take initiative and assume responsibility, being free from fears and worries, being sensitive to and valuing the opinions of others, and being slow in making decisions.

Tables 1 to 5 inclusive indicate the extent of differentiation between the successful and the less successful teachers with respect to each of these traits. The inventory items are given following each table in order that the reader may judge the validity of the classification, and, if he wishes, may rearrange them in a different and possibly more logical classification.

Table 1

Items Indicating a Social Attitude

Item Number	Preferred Response*	Per Cent Giving Preferred Response		Diff. in %	P.E. of Diff.	Ratio: $\frac{\text{Diff.}}{\text{P.E.}}$
		Better Teachers	Less Successful Teachers			
4	No	53	41	12	3.9	3.1
7	Yes	79	65	14	3.5	4.0
8	No	80	65	15	3.5	4.3
13	No	75	62	13	3.6	3.6
15	No	48	42	6	3.9	1.5
19	No	73	59	14	3.9	3.6
28	No	74	62	12	3.6	3.3
45	No	76	65	11	3.6	3.1
47	Yes	69	64	5	3.7	1.4
50	Yes	88	82	6	2.8	2.1
51	No	89	84	5	2.7	1.9
3A	Yes	80	73	7	3.4	2.1

* The "preferred response" is that given by the better teachers more frequently than by the less successful teachers.

The first column in each of these tables indicates the number of the item in the personality inventory. The second column indicates the response which was given by the better teachers more frequently than by the less successful teachers. Column three indicates the per cent of better teachers giving this preferred response and column four the per cent of less successful teachers giving this response. Column five gives the difference between the per cents shown in columns three and four. Column six shows the probable error of this difference and column seven the ratio of the difference to the probable error.

The items given in Table 1 are as follows: 4. Are you disturbed if you happen to make some slight social error? 7. Would you dislike working in some remote location, where you would have little opportunity to meet other people? 8. At a social gathering, do you hesitate about meeting a celebrity who happens to be present? 13. Do you feel uncomfortable when talking with a noted person or someone in a high business position? 15. Do you often like to be alone? 19. Do you greatly dislike speaking or acting in the presence of a large audience? 28. Do you often feel lonesome when in the company of others? 45. Are you often uncomfortable because of shyness or bashfulness? 47. Do you talk freely at social parties? 50. Do you find it easy to make new friends? 51. Are you greatly embarrassed if you speak to a stranger by mistake? 3A. Do you enjoy arguing?

Table 2

Items Indicating Initiative and Leadership

Item Number	Preferred Response	Per Cent Giving Preferred Response		Diff. in %	P.E. of Diff.	Ratio: $\frac{\text{Diff.}}{\text{P.E.}}$
		Better Teachers	Less Successful Teachers			
18	Yes	87	71	16	3.2	5.0
30	Yes	74	55	19	3.7	5.1
39	Yes	46	33	13	3.8	3.4
48	Yes	51	46	5	3.9	1.3

Table 3

Items Indicating Freedom from Fears and Worries

Item Number	Preferred Response	Per Cent Giving Preferred Response		Diff. in %	P.E. of Diff.	Ratio: $\frac{\text{Diff.}}{\text{P.E.}}$
		Better Teachers	Less Successful Teachers			
20	No	54	43	11	3.9	2.8
22	No	64	56	8	3.8	2.1
25	No	42	30	12	3.7	3.2
26	No	82	76	6	3.2	1.9
41	No	66	56	10	3.8	2.6
57	No	80	73	7	3.3	2.1

The items listed in Table 2 are as follows: 18. Do you enjoy assuming additional responsibilities? 30. Have you held the position of chairman or leader of a group within recent years? 39. Have you ever solicited money for some worthy cause? 48. Do you prefer to assume entire responsibility in a given situation, rather than share such responsibility with others?

The items given in Table 3 are as follows: 20. Does some useless thought ever keep coming back to your mind? 22. Are you often unhappy because of the thought of some possible misfortune? 25. Do you occasionally have periods of loneliness? 26. Do you frequently refuse to do things because of fear of failure? 41. Do you often feel "down and out"? 57. Are you sometimes worried by the feeling that people on the street are watching you?

Table 4

Items Indicating a High Regard for the Opinions of Others

Item Number	Preferred Response	Per Cent Giving Preferred Response		Diff. in %	P.E. of Diff.	Ratio: $\frac{\text{Diff.}}{\text{P.E.}}$
		Better Teachers	Less Successful Teachers			
16	Yes	35	29	6	3.6	1.7
29	Yes	82	74	8	3.3	2.4
36	Yes	88	81	7	2.8	2.5
37	Yes	44	38	6	3.8	1.6
55	No	24	17	7	3.1	2.3
8A	No	69	53	16	3.8	4.2

Table 5

Items Indicating Deliberateness in Making Decisions

Item Number	Preferred Response	Per Cent Giving Preferred Response		Diff. in %	P.E. of Diff.	Ratio: $\frac{\text{Diff.}}{\text{P.E.}}$
		Better Teachers	Less Successful Teachers			
31	Yes	29	23	6	3.4	1.8
38	Yes	37	32	5	3.7	1.4

The items listed in Table 4 are as follows: 16. Are you embarrassed by ridicule even when you know you are right? 29. Do you like to get the opinion of many people before making important decisions? 36. Can you accept criticism without feeling hurt? 37. Are you much affected by praise or blame? 55. Had you rather be alone when under emotional strain. 8A. Do you often offend others without realizing it at the time?

The items listed in Table 5 are as follows: 31. Does it take you a long time to decide which of two things you should do? 38. Do you tend to be slow in making decisions?

A study of tables one to five reveals that the differentiation between the better and less successful teachers by many of the individual inven-

tory items is not highly significant.[3] However, two of the four items indicating a willingness to take initiative and assume responsibility (Table 2) show a difference of at least five times the probable error of this difference. Of the twelve items indicating a tendency to be at ease in social contacts (Table 1) seven items show a difference greater than three times the probable error of the difference. In Tables 3 and 4 the differences are less significant although each table contains one item for which the difference is greater than three times the probable error. The two items indicating a tendency to be slow in making decisions (Table 5) show even less differentiation between the successful and less successful teachers and perhaps should not have been mentioned in this report. However, it was thought best to report these two items as no item was found in the inventory indicating a trait in conflict with this tendency.

Table 6 presents data for eight additional items which the writer found difficult to classify.

Table 6

Unclassified Items

Item Number	Preferred Response	Per Cent Giving Preferred Response		Diff. in %	P.E. of Diff.	Ratio: $\frac{\text{Diff.}}{\text{P.E.}}$
		Better Teachers	Less Successful Teachers			
1	Yes	74	62	12	3.6	3.3
3	No	70	61	9	3.7	2.4
21	Yes	39	33	6	3.7	1.6
23	Yes	58	41	17	3.9	4.4
58	Yes	49	44	5	3.9	1.3
1A	No	7	2	5	1.6	3.1
2A	Yes	71	62	9	3.7	2.4
4A	No	77	69	8	3.5	2.3

The items listed in Table 6 are as follows: 1. Do you feel that you can speak better than you can write? 3. In your contacts with overbearing persons, do you attempt to treat them as they do you? 21. Have you ever become so absorbed in creative work that you did not feel the need of intimate friends? 23. Do you prefer a movie to a dance? 58. Do you tend to be critical of other people? 1A. Do you prefer to be out-of-doors for your recreation and relaxation? 2A. Do you like to study? 4A. Do you prefer the company of people younger than yourself?

[3] A difference equal to the probable error of the difference means that the chances are 3 to 1 that a real difference exists between the better and less successful teachers with respect to that item, a difference equal to twice the probable error means the chances are 10 to 1 that a real difference exists, a difference of three times the probable error indicates a 45 to 1 chance, a difference of four times the probable error a 286 to 1 chance, and a difference of five times the probable error a 2681 to 1 chance.

Table 7 is an attempt to summarize the data presented in Tables 1 to 5 inclusive. The first column of this table indicates the trait. The second column indicates the number of personality inventory items indicative of the trait. The figures shown in the third column are the averages computed from the seventh column in each of the previous tables.

Table 7

Summary of Traits Characteristic of the Successful Teacher

Trait	Number of Items Indicative of the Trait	Average of the Ratios:* Difference / P.E.
Social or at Ease in Social Contacts. Table 1	12	2.8
Willingness to Take Initiative and Assume Responsibility. Table 2	4	3.7
Freedom from Fears and Worries. Table 3	6	2.5
Sensitive to and Valuing the Opinion of Others. Table 4	6	2.5
Slow in Making Decisions. Table 5	2	1.6

* No statistical justification for averaging ratios is offered. However, these averages do give some idea of the magnitude of the ratios shown in the previous tables.

Relationship of Teacher Personality Scores to Ratings for Teaching Ability

The personality inventories as originally filled out by the 301 individuals included in this study were next scored with respect to the 43 items shown in Tables 1 to 6. Weights from one to three were assigned to these items according to the degree to which they differentiated between the better and the poorer teachers. The resulting scores will be referred to hereafter as teacher personality scores.

Table 8 shows the relationship between the resulting teacher personality scores and the original ratings of teaching success or ability. The first column indicates the group: the twelve groups at the air corps technical school and the two groups at the University of Illinois. The second column indicates the number in each group. The third and fourth columns indicate the mean teacher personality scores for the better and poorer teachers respectively. The fifth column shows the difference between these means.

Because the item weights for teacher personality are being used on the same group from which these weights were derived, there will of necessity be a tendency, throughout the group as a whole, for the better teachers to have higher scores than the poorer teachers. It is interesting to note, however, that this tendency also holds for all but one of the

Table 8

Teacher Personality Scores of Better and Poorer Teachers

Air Corps Technical School	N	Mean Score		Difference in Mean Scores
		Better Teachers	Poorer Teachers	
Div. No. 1	20	48.2	39.0	9.2
Div. No. 2	20	58.8	42.8	16.0
Div. No. 3	19	53.2	42.8	10.4
Div. No. 4	19	49.9	42.0	7.9
Div. No. 5	20	52.2	42.8	9.4
Div. No. 6	20	55.1	43.1	12.0
Div. No. 7	19	54.8	46.1	8.7
Div. No. 8	19	52.7	45.7	7.0
Div. No. 9	20	44.1	48.6	−4.5
Div. No. 10	20	51.0	38.0	13.0
Div. No. 11	20	53.0	44.5	8.5
Div. No. 12	23	54.0	46.9	7.1
Total	239	52.27	43.52	8.75
Apprentice Ag. Ed. Teachers	47	56.2	54.9	1.2
Apprentice Home Ec. Teachers	15	54.4	50.8	3.6
Total Apprentice Teachers	62	55.9	53.7	2.2

fourteen sub-groups. For most groups from the air corps technical school, the difference in mean scores is rather large. For the total group of 239 from the air corps school the difference is 8.75 which is slightly more than ten times (10.1) the probable error of this difference.

The difference in mean scores for the two University groups is much smaller than for the average of the air corps groups. One reason for this may be the wide range of teaching ability among the air corps teachers as compared with the university groups. The appointment of many of the air corps instructors had been made rather hastily because of the necessity of rapidly increasing the teaching staff. For the same reason there was a reluctance to eliminate instructors even after they had proved themselves to be inferior teachers, and finally the air corps instructors selected for this study were, as was stated at the beginning of this article, from the extremes of this already wide range of ability—approximately the ten per cent best and the ten per cent poorest instructors. The university apprentice teachers, on the other hand, were a rather select group, in the last year of a four year college course preparing specifically for entrance into the teaching field.

Another cause for the smaller difference in mean scores for the Uni-

versity groups may be that ratings for teaching success at the University were made on a basis somewhat different from that by which the teaching success of the air corps teachers was judged. It would seem that ratings for teaching success based on observations of work in a full time teaching situation would be more valid than those based on observations over a comparatively short practice teaching period especially when subjected to the halo effect of the practice teacher's success in university theory classes. But regardless of which ratings are more valid, the basis for selection used at the air corps school was the predominant factor in determining the weighting for the teacher personality score, for the air corps teachers outweighed the university practice teachers about 4 to 1. Thus these scoring weights, largely determined by the air corps groups, would tend to give greater difference in teacher personality score between the better and poorer teachers of these groups than between the better and poorer teachers of the university groups.

A study of the difference column in Table 8 shows a wide range in these differences—from a negative 4.5 for division number 9, to 16.0 for division number 2. Stated objectively the cause of the negative difference for division number 9 is that the men selected as better instructors from this division gave responses on their personality inventories more like the responses of the poorer than of the better instructors selected from the other eleven divisions. Is it possible that the magnitude of these differences may be considered as a measure of the ability of the supervisors to differentiate between their better and poorer instructors? No objective measure of such ability for the respective supervisors seemed available at the time the study was made. However, just recently such a measure has become available—provided we consider this ability to differentiate between better and poorer instructors as a significant factor in the supervisor's ability to organize and supervise his division of the school. The extent to which supervisors are advanced in responsibility should be a measure of their ability as supervisors. Due to the rapid growth of the air corps technical schools there has been a large number of changes in supervisory personnel since the study was made. Three of the division supervisors have been made head of a whole school, six have been made head of a major division of a whole school, and three have received no promotion. The average of the difference in the mean scores of those divisions whose supervisors were promoted to head of a school is 10.9. The average of the differences in the mean scores of those divisions whose supervisors were promoted to head of a major division of a school is 10.1 and the average of the differences of those divisions whose supervisors received no promotion is 3.9.

Now let us see what information our data furnish as to the value of

the teacher personality score as a predictive measure of teaching success. If this teacher personality score is indicative of teaching success, we would expect, because of the selective factors mentioned earlier, that the scores of the university groups would average higher than the scores of the air corps groups and that the variability of scores of the air corps groups would be greater than the variability of the university groups.

Table 9 compares the mean and standard deviation of these scores for the air corps and university groups. It will be seen that the mean score of the university group is 55.3 or 7.3 points higher than the air corps group—a difference which is 8.7 times the probable error of this difference. Also the standard deviation for the air corps group is 10.7 or 2.5 points greater than that of the university group—a difference which is 4.2 times the probable error of this difference. It should be noted, as

Table 9

Mean and Standard Deviation of Teaching Personality Scores

	University Group N = 62	Air Corps Group N = 239	Difference	P.E. of Diff.	Ratio: $\frac{\text{Diff.}}{\text{P.E.}}$
Mean score.....	55.3	48.0	7.3	.84	8.7
Standard deviation..	8.2	10.7	2.5	.60	4.2

was pointed out previously, that because the university groups were outnumbered 4 to 1, it was the individuals in the air corps groups that carried most weight in determining what are the personality traits of the successful teacher. It therefore seems doubly significant that even on this basis of scoring the university apprentice teacher groups scored higher than the air corps groups.

Relationship of Teacher Personality Scores to Expressed Liking for Teaching

Another indication of the validity of the teacher personality score as predictive of teaching success is the relationship between this score and liking for teaching. At the end of the personality inventory used in this study was the following question:

"Please indicate how much you like teaching. 1. very much; 2. only moderately; 3. actually dislike teaching."

This question was not used in any way in determining the teacher personality score and, therefore, the liking for teaching as expressed by answers to this question represents an independent measure. The relationship between expressed liking for teaching and teaching personality score is shown in Table 10. The last three columns indicate mean

teacher personality scores. The first of these three columns contains the mean scores of those instructors who indicated that they liked teaching very much, the second of those who indicated that they liked teaching only moderately, and the last column contains the mean scores of those who indicated that they actually disliked teaching. For the groups from the air corps technical school, Table 10 seems to indicate a relationship between teacher personality score and liking for teaching approximately as significant as the relationship between teacher personality score and ratings for teaching success as was indicated in Table 8. If we consider

Table 10

Teacher Personality Scores Grouped According to Expressed Liking for Teaching

Air Corps Technical School	N	Mean Scores		
		Very Much	Moderately	Dislike
Div. No. 1	20	48.5	43.0	41.9
Div. No. 2	20	58.1	48.5	41.3
Div. No. 3	19	51.3	41.4	43.0
Div. No. 4	19	48.1	50.0	31.3
Div. No. 5	20	49.0	46.0	54.0
Div. No. 6	20	53.1	50.0	37.0
Div. No. 7	19	48.6	54.0	49.3
Div. No. 8	19	52.3	44.4	*
Div. No. 9	20	49.3	47.0	32.5
Div. No. 10	20	56.0	40.2	44.0
Div. No. 11	20	58.8	48.3	40.3
Div. No. 12	23	56.2	45.5	*
Total	239	52.19	46.28	41.09
Apprentice Ag. Teachers	47	56.1	54.1	*
Apprentice Home Ec. Teachers	15	53.1	53.5	*
Total	62	55.38	54.05	

* No cases.

the mean scores of the air corps instructors as a single group, we find that the difference between the mean scores of those who like teaching very much and those who actually dislike teaching (11.1) is considerably greater than the difference between the mean scores of those who were rated better and those who were rated poorer teachers (8.75).

Table 10 also shows a rather consistent relationship in each of the twelve sub-groups of the air corps school. The greatest irregularity is in the dislike column. Part of this irregularity is due to the small number of cases in this column. Some of the sub-groups are represented by only one or two cases in this column and the total number of cases in this

column is 33. The small differences indicated for the university groups are probably due in part to the influences already mentioned in discussing Table 8.

The coefficient of correlation between liking for teaching and teacher personality score for the 239 teachers from the air corps school was found to be +.42.[4] To check on this relationship between liking for teaching and teacher personality score, the personality inventory was given to an entirely new group—the graduating class of another air corps technical school. This class numbered 377 and the coefficient of correlation was found to be +.57.[4]

Again because of the selective factors mentioned earlier we would expect the university group to express more liking for teaching than the air corps groups. Also we would expect a wider range of liking for

Table 11

Liking for Teaching

	Like Very Much		Only Moderately		Actually Dislike Teaching	
	No.	%	No.	%	No.	%
University Groups						
N=62.....	51	82	11	18	0	0
Air Corps Groups						
N=239.....	100	42	106	44	33	14

teaching among the air corps group. From Table 11 it will be seen that 82% of the apprentice teachers in the university groups stated that they liked teaching very much and none of this group actually disliked teaching. On the other hand, only 42% of the instructors in the air corps groups expressed a great liking for teaching and 14% stated that they actually disliked teaching.

Summary

A group of 301 teachers filled out a personality inventory. The group was then divided, on the basis of ratings by supervisors, into two groups: the more successful teachers and the less successful. An analysis of responses to the inventory revealed that the more successful teachers reported themselves as (1) more social or at ease in social contacts, (2) more willing to take initiative and assume responsibility, (3) are less

[4] Computed by the method proposed by Peters and Van Voorhis for quantitative variates having unequally spaced intervals with correction for broad categories. *Statistical procedures and their mathematical bases.* New York: McGraw-Hill Book Co., 1940. P. 400.

subject to fears and worries, (4) are more sensitive to the opinions of others, and (5) are slower in making decisions than the less successful teachers.

Weights from one to three were then assigned to the 43 personality inventory items according to the degree to which each item differentiated between the more successful and the less successful teachers. The personality inventories were then scored on the basis of these weights and the resulting scores were called teacher personality scores.

A comparison of teacher personality scores with ratings for teaching ability showed a significant relationship for the group as a whole—as would be expected from the manner in which the teacher personality scores were derived. This relationship was found also to be consistent in all but one of the 13 subgroups.

Of the 301 teachers in the total group, 239 were teaching in a rapidly expanding air corps technical school and 62 were education majors completing their senior year. From the manner in which these two groups were selected there is reason to believe that the university group would average higher in teaching ability and would have less variability with respect to teaching ability than the teachers from the air corps school. A comparison of these two groups with respect to teacher personality score showed the average score of the university group to be 7.3 points higher than that of the air corps teachers—a difference which is 8.7 times ts probable error. With respect to variability, the teacher personality scores of the air corps teachers were found to have a standard deviation 2.5 points greater than the scores of the university groups, a difference 4.2 times its probable error.

At the time the personality inventories were filled out, each teacher was asked to indicate the degree to which he liked teaching. A significant relationship was found to exist between teacher personality score and these expressed likings for teaching. Also the probable superiority of the university group with respect to teaching ability and the probably greater variability of the air corps group was reflected in an expressed greater liking for teaching on the part of the university group and a greater variability in the expressed liking for teaching on the part of the air corps group.

Change in Evaluative Attitudes During Four Years of College *

Seth Arsenian

Department of Psychology, Springfield (Mass.) College

It is generally agreed that attitudes are linked in the individual's life with a system of values determined largely by biologic needs, personal experience, and social norms. Attitudes, furthermore, denote specific or general mental-motor dispositions or reaction tendencies which qualify our interpretation and give direction to our responses to new stimuli. Attitudes generally have an affective component; they are dynamic, and more or less persistent. According to Kimball Young (16) "Attitudes, in a sense, telescope behavior into shorthand forms," and as such, a knowledge of them "should aid us in understanding and controlling behavior."

In evaluating the efficacy of the so called "higher" education we have attempted in the past to test the kind and amount of knowledge that the student has accumulated as a result of his college experience.[1] Without minimizing the importance of the acquisition of knowledge and skills, it is necessary that in this process of evaluation we take account of changes in student attitudes that may have taken place during the college years.

The present investigation was undertaken to study the amount and the direction of change of student attitudes during four years of college in theoretical, economic, aesthetic, social, political, and religious areas, and to observe in some detail factors related to changes in student attitude toward religion.

Part I. Change in Six Basic Attitudes During Four Years of College

A. *Selection and Retention of Students.* At the time of their admission to college three successive freshman classes were given the Allport-Vernon Study of Values Test (1). This well-known test attempts to measure the relative prominence of six evaluative attitudes, which may be described as follows:

1. *The theoretical* with its dominant interest in the discovery of truth.
2. *The economic* with its characteristic interest in the "practical" and the useful in a definitely materialistic sense.

* Prepared for presentation at the William James Centenary Convention of the American Psychological Association in Boston, Sept., 1942.

[1] See Learned, W. S., and Wood, Ben D. *The student and his knowledge.* The Carnegie Foundation for the Advancement of Teaching, 1938.

3. *The aesthetic* with its chief interest in the artistic episodes of life, looking always for form, harmony, grace, symmetry, or fitness.

4. *The social* tending strongly towards love of people "whether of one or many, whether conjugal, filial, friendly, or philanthropic" (1).

5. *The political* aiming at place, prestige, dominance, and power.

6. *The religious* desiring to comprehend the cosmos and to see the unity of man with the cosmic totality.

The college where this investigation was conducted is a men's college in New England. It is not a liberal arts college, but a professional school of, what for lack of a better term, is often called "human engineering." It offers preparation in recreation, health and physical education, social group work, and teaching. The curriculum of the college lays great emphasis on biological and social sciences, especially on the applied aspects of these sciences. Religious instruction and motivation find greater emphasis here than in most American colleges.

Table 1

Evaluative Attitudes of Three Freshman Classes

	1938		1939		1940	
Attitude	Mean	σ	Mean	σ	Mean	σ
Theoretical	31.36	6.38	29.90	6.36	29.19	5.94
Economic	29.62	6.15	29.60	6.09	29.08	5.58
Aesthetic	22.17	6.66	22.16	6.12	21.34	6.33
Social	31.10	5.84	30.94	5.19	32.10	5.34
Political	32.00	6.77	32.88	6.24	33.61	6.51
Religious	34.94	7.84	34.96	6.81	34.66	7.08

For the three years from 1938 to 1940 the Freshmen entering this college were given the Study of Values test as part of the college testing program. The results on this test are shown in Table 1.

Note the consistency in the order of dominance of values in these three classes. With one exception,[2] which is practically negligible from the point of view of average score, the order of values is: religious, political, social, theoretical, economic, and aesthetic.

These results, in harmony with the results on this test reported by other investigators for the past ten years,[3] show that colleges select their students from the point of view of their basic interests and attitudes.

It is to be noted further that the retention of students in the College is influenced by the agreement or disagreement of the pattern of the students' interests with that of the college. In Table 2, a comparison

[2] Theoretical and social scores in class entering in 1938.

[3] For a bibliography on this test see Reference 2 at the end of this paper.

is made between the patterns of attitudes of students who left the college before the Junior year[4] and those who stayed to graduate.

As compared with students who stayed to graduate, those who left show a weaker social motivation and stronger economic and political interests, which are quite incompatible with the cultural climate and the direction of the curricular and extracurricular emphases on this campus.

B. *Change of Attitudes During College.* Seventy-six students who stayed to graduate four years after their admission to the college were given the Allport-Vernon test in their Senior year shortly before the end of the school year. A comparison by majors[5] between the scores of students who took the test during their freshman and senior years is presented in Table 3.

Table 2

Evaluative Attitudes of Students Who Left School and of Students Who Stayed to Graduate

	Students Who Left N=56		Students Who Graduated N=76		Significance of Difference
Attitude	Mean	σ	Mean	σ	$\frac{D}{\sigma \text{ Diff.}}$
Theoretical	30.32	6.52	32.44	5.92	1.93
Economic	30.32	6.72	26.74	5.74	3.20
Aesthetic	22.64	6.26	22.94	6.68	.27
Social	29.92	4.56	35.14	5.22	6.07
Political	33.14	6.94	30.80	5.98	2.04
Religious	33.92	8.24	32.26	8.12	1.15

It will be noted that the pattern of change of attitudes is somewhat different in the two groups. For the students majoring in health and physical education there are three statistically significant changes in evaluative attitudes, namely, decrease in the religious and increase in the dominance of the social and aesthetic interests. Comparing the ordinal positions of the attitudes in Freshman and Senior years we note only one change; that is the exchange of the social and the religious interests. The social attitude climbs from the fourth in Freshman to the first place in the Senior year, while the religious attitude moves down from the first in Freshman to the fourth place in Senior year.

For the students majoring in the social science division there are only

[4] Students who left during their Junior or Senior years were not included because most of them left to enter the military service, and would otherwise have continued their studies in the college.

[5] There were only three students in the Teacher Education major and they were eliminated from this comparison.

two statistically significant changes in interests, namely, in the economic which shows a decrease and the social which shows an increase. In the comparison of the ordinal positions, we again note an exchange of places between the religious and the social interests. The social attitude occupying second place in the Freshman year climbs to the first in the Senior year while the religious attitude occupying first place in the Freshman year recedes to second in the Senior year. Be it noted, however, that the difference in average score in Senior year between the religious and the social attitudes for this group is .06 of a point, *i.e.*, it is practically negligible, and that the average of the religious attitude is still very high.

Whitely (15) at Franklin and Marshall College administered the Study of Values to 84 students once each year from Freshman to Senior years. He found a very slight tendency for the aesthetic scores to in-

Table 3

Comparison of Scores on Study of Values between Freshman and Senior Years Health and Physical Education and Social Science Majors

	Health and Physical Education						Social Science					
		Freshman		Senior		D		Freshman		Senior		D
Attitude	No.	Mean	σ	Mean	σ	σ diff.	No.	Mean	σ	Mean	σ	σ diff.
Theoretical.	47	33.36	6.42	33.22	6.24	.17	26	30.58	5.86	31.88	5.10	1.34
Economic..		29.40	6.26	27.90	5.68	1.53		29.04	6.48	24.42	5.40	3.50
Aesthetic...		20.04	6.56	22.92	6.80	3.03		21.34	5.36	22.12	5.90	.72
Social.....		30.88	5.30	35.02	5.28	5.11		32.50	6.44	37.26	4.12	4.07
Political....		32.54	5.38	32.96	4.66	.59		29.58	6.48	27.80	6.20	1.50
Religious...		34.20	7.10	29.36	7.02	4.57		38.12	7.72	37.20	7.76	.59

crease and for the religious scores to decrease during the four years. He concludes that the values are fairly stable and the college experience does not change them.

Todd (12) administered the Study of Values test to 94 students in the last year of their High School and again at the beginning of their sophomore year in college. These students attended various colleges. He finds that there is a change in student values and the change is in the direction of values generally emphasized in the contemporary American culture. Dr. Todd describes the contemporary American cultural norms in the following statement: "The emphasis on securing tangible wealth (economic), gaining renown and power (political), and the utility of scientific knowledge (theoretical), greatly outweighs the consideration of improved social conditions (social), the unity of religious experience (religious), and the aesthetic satisfaction of life (aesthetic)" (p. 41). He finds that the student values in their sophomore year assume the order

of dominance of values as follows: economic, theoretical, political,[6] social, religious and aesthetic. By implication Dr. Todd points out that apparently our colleges are merely reflecting the cultural norms, namely, emphasizing in the development of the personalities of their students the same values that are dominant in our contemporary culture.

The results of the present investigation are at variance at some points with both of the studies just reported. First, there are statistically significant changes in student values or attitudes from Freshman to Senior year.

Second, these changes depend on the philosophy, curricular content and the general emphases of the college or the major division where the student elects to do his work. The differential patterns of values in the social science and the health and physical education divisions are in the direction of the respective emphases of these two divisions.

Table 4

Intercorrelations of Value Scores on the Freshman and Senior Levels

Evaluative Attitudes	Level	Economic	Aesthetic	Social	Political	Religious
Theoretical	Fresh.	.13	−.34*	−.27	−.23	−.33*
	Senior	−.19	−.15	−.17	−.12	−.25
Economic	Fresh.		−.38*	−.24	.19	−.60*
	Senior		−.21	−.29*	.28	−.42*
Aesthetic	Fresh.			−.04	−.17	−.06
	Senior			−.14	−.19	−.31*
Social	Fresh.				−.43*	.08
	Senior				−.30*	.05
Political	Fresh.					−.25
	Senior					−.47*

* Indicates that r is four times or more of its Probable Error. The average P.E. for these r's is −.07.

Third, assuming Dr. Todd's analysis of the contemporary American cultural norms to be correct, it must be conceded that the value patterns developed or emphasized in individual colleges are not necessarily in agreement with the dominant or "average" contemporary cultural norms. This may perhaps be an argument in favor of the independent colleges.

C. *The Interrelation of Values.* In order to study the relation of the values among themselves the intercorrelations between the six value scores were calculated on the Freshman and the Senior levels. In examining the intercorrelations the structure of this particular test must be borne in mind, namely, that the change in the score of any one value

[6] Scores for political and social are practically equal, being respectively 30.78, 30.83.

is necessarily accompanied with the change in score on one or more of the scores of the remaining five values in the scale.

These intercorrelations which on the whole are in substantial agreement from the freshman to the senior level bear testimony to the internal consistency of the Study of Values scale. It will be of interest to note some of the significant relationships between the values. Negatively related are: Economic and religious values; economic and aesthetic values; economic and social values; theoretical and aesthetic values; theoretical and religious values; political and social values; political and religious values; and aesthetic and religious values.

The single significant positive relationship is between economic and political values.

With the exception of one correlation, aesthetic and religious, which is probably not indicative of a general trend, these correlations seem to indicate the apparent disagreement or the conflict between the economic, theoretic and political values as against the aesthetic, religious, and social values. The opposition or conflict of these values (see definitions at the beginning of this paper) is palpably apparent in our culture and is manifested again and again in the personal lives of individuals, as counselors, who observe the fundamental motivations of individuals facing problems, will testify.

Part II. Change in Attitude Toward Religion

A. *Estimate of Change in Religious Attitude.* According to Spranger whose descriptions of Types of Men (10) form the bases on which the Study of Values Test has been constructed, the characteristic of religious attitude is a dominant desire on the part of the individual to seek to comprehend the universe and to see his own unity with this cosmic totality. He, the religious man, sees something divine in every event or seeks to unite himself with a higher reality. Keeping this definition in mind the students were asked to answer the following question: "Do you think that over the past four years your attitude toward religion (underline one of the three) . . . (*a*) has become more favorable; (*b*) has remained unchanged; (*c*) has become less favorable."

Of those who answered this question, 66% indicated that their attitude toward religion had become more favorable, 22% said that their attitude had remained unchanged, and 12% that their attitude had become less favorable. There is only a remote correspondence between these estimates and the actual change in test scores of religious attitude. The actual increase or decrease in scores for the three groups respectively are: -1.74 ($N=39$), -5.73 ($N=13$), and -4.36 ($N=7$). It seems that the correspondence between estimates and test scores is in the general

trend rather than in actual scores. There are at least two possible explanations. Assuming the validity of the test in measuring religious attitude, one may think that the change is an unconscious process, and that the student, either because he thinks his present attitude is more satisfactory than what it was four years ago, or because he thinks that it is desirable to have a favorable attitude toward religion, indicates that his attitude is more favorable than it actually is. Or it may be that the student's estimate is correct but that his definition of religion is different from that which the test measures.

B. *Factors Influencing Change in Religious Attitude.* The second question read as follows: "In looking over your total experience for the

Table 5

Factors In and Outside College Influencing Attitude Toward Religion

Factor	Contributing toward increase in favorable attitude toward religion	Contributing toward decrease in favorable attitude toward religion	No influence one way or another
Parents	32	1	27
Sisters and brothers	17	1	37
Relatives	13	4	44
Professors and courses	48	10	8
School mates	32	22	14
College clubs and organizations	17	5	42
Clubs and organizations outside of college	21	—	37
Summer camps	28	1	23
Church (if you attend)	34	10	15
Reading	37	8	17
Events (specify)	—	—	—
Other (specify)	—	—	—
Total	279	62	264

past four years what factors in and outside college have influenced your attitude toward religion?" The responses to this question are shown in Table 5.

The favorable or neutral influences noted are over four times the unfavorable ones. The influences coming from the sources listed in this table are largely favorable to religious attitude or are neutral. If we subtract the instances of unfavorable influences from favorable influences, leaving the neutral column out, the relative order of favorable sources of influences are as follows: professors and courses, parents, reading, summer camps, church, clubs and organizations outside of college, sisters and brothers, college clubs and organizations, school mates, and relatives.

The efficacy of any one of these factors in comparison with others cannot be weighed, however, the relative frequency of mention of these sources is of interest.

William James some forty years ago (6) documented and emphasized the fact of the varieties of religious experience. Borrowing the words from James one may well speak about the varieties of religious influences. In addition to the factors listed in the table a number of students specified particular persons, events, and experiences which had influenced their attitude toward religion favorably or unfavorably. Some of the factors specified as of favorable import were: birth of our son; girl friend and family; a trip through Sing Sing Prison; seemingly impossible things happening; wars; personal thinking; aesthetic experiences leading to contemplation of my relation to physical universe; movies—"How Green Was My Valley"; contact with certain friends; and various field trips. In one case war was mentioned as a favorable factor, in two cases as unfavorable. The same factor may influence a person favorably toward religion, be a negative influence for a second, and be neutral to a third. There are thus varieties of religious influences, and their favorable, unfavorable or neutral impress will depend on the individual's (going back to James (6) again) 'apperceiving mass.'

C. *General or Particular Nature of Change in Attitude.* Question arises whether a person who changes his attitude toward religion is likely to be one who changes opinions and attitudes with relative facility or difficulty in other aspects of life. To this end, the students were asked this question: "Do you in general change opinions, attitudes or beliefs (in religion, politics or any other area) easily, with difficulty, or not at all? Rate yourself on the following scale by making a check mark in the appropriate space." A scale from 0 to 100 extending from "almost no change" to "changes extremely easily" was provided. The students rated themselves on this scale and the ratings ranged from 15 to 95% point, however the Pearson r between these ratings and the actual change in score on religious attitude was exactly zero. There are two possible explanations. Either the student's rating of his own plasticity or rigidity is not accurate and dependable, or else the change in attitude in one area of belief does not necessarily indicate a general changeability in the person.

D. *A final question on this questionnaire* to the students asked: "Do you think that over the past four years your concept of religion has changed appreciably?" This question was answered in the affirmative by 75% (N = 47) and in the negative by 25% (N = 16).

"In what sense has this concept changed?" The students who reported change of concept were asked to write not more than a page on

this question. These statements were very helpful, but before starting on their analysis, I must mention that two of the students who reported no change in concept wrote statements which quite likely represent the two extremes of the "no change in concept" group.

One of these two wrote a rather lengthy statement giving his religious history. In his life, because of change of religious affiliation of one of the parents and because, no doubt, of his high intelligence and inquiring mind the "religious crisis" or hard thinking about religion came before his entrance to the college. His college experience merely widened and strengthened certain convictions which were already rather intelligently thought out.

The other case is that of one who faced no religious crisis while in high school, and managed to postpone it during the four years of college. However, he was conscious of an unsolved problem. He wrote asking for help.

The statements of the 47 students who reported change in religious concept were analyzed by the writer and a colleague,[7] who has specialized in religion and philosophy, from the point of view of kind and frequency of ideas expressed. In comparing the notes of the analyses made independently substantial agreement was found on the following summary of ideas expressed by students:

1. Criticism of and disagreement with organized religion (church) and religious doctrines, rules, rituals, symbols, "legend and superstition" (literal acceptance of the Bible, divinity of Christ, virginity of Mary, etc.)[8]..... 39
2. Emphasis on the social gospel and the ethical relation of man to man, and that this is expressed in daily living, that such a life is practicable..... 29
3. Toward a more rational, objective, "scientific" approach.. 16
4. Toward broader, more liberal and tolerant view, and finer appreciation of Christianity and of other faiths..... 15
5. Religion as a more permeating force, as basis for a life philosophy, firmer, and more devout, more vibrantly alive..... 13
6. Increased clarity and depth (stated)..... 2
7. Greater confusion..... 2
8. Return to literal Christianity and Mysticism..... 2
9. Less faith and conviction..... 1
10. Criticism of protestant intellectualism as unsatisfying..... 1

[7] Dr. Hugo Thompson.

[8] Compare with analysis of religious doubt by Starbuck (11).

In reading these statements, which are generally quite candid and free, one is impressed with the fact that there is a great amount of religious readjustment that takes place from the Freshman to the Senior year. The Freshman, quite conservative and somewhat smug in his restricted and determinate religious beliefs experiences a series of shocks as he goes through courses in biology, psychology, physics, physiology, and analytical courses in religion, or comes in contact with school mates whose profession of faith or unfaith may be different from his. The total structure, already somewhat insecure, seems to break down, and the reconstruction is a very difficult task full of emotional and intellectual hazards. There are those who face the difficult task with courage, others who use some method or rationalization and find it difficult to extricate themselves from logical inconsistencies, and still others who like Scarlet O'Hara "will not think about it until tomorrow."

The analysis of these personal statements was supplemented by an item analysis of the Study of Values Test, which because of lack of space will not be reproduced here.

On the whole, the analysis of the test items and that of the personal statements by students corroborate each other in pointing to a growing concept of religion which is more theistic than deistic; which expresses itself more in daily living and the man's relation to man than in ritual, form, or doctrinal dogma; which is more socially active than personally passive; which is broader and more tolerant than uncompromising and fixed; which is concerned more with practical living than with mystic contemplation or enjoyment. There is a determined attempt at reconciling religious belief with scientific fact, but complete or logical harmony between the two has not been achieved, certainly not by all. Religion now is more encompassing; it is manifest in many more aspects of personal and social life than before, it attempts to be more rational, but whether its feeling tone is stronger than before is open to question.

Summary and Conclusions

1. *Major findings*:

(*a*) The philosophical orientation and professional objectives of a college expressed in terms of evaluative attitudes act as selective criteria in the admission and retention of students.

(*b*) The value patterns of students change during four years of college experience.

(*c*) The direction of change of values is not necessarily in complete harmony with the estimated pattern of the contemporary American culture. It depends upon the nature and content of the curriculum and the extra-curriculum provided in a particular environment or sub-culture.

(*d*) There is an apparent conflict or negative relationship between theoretical, economic, and political values as against the social, religious and aesthetic values,—these values as defined and interpreted by Spranger.

(*e*) A large amount of religious readjustment takes place among students during the period from the Freshman to the Senior year.

(*f*) More than half of the students report that during their college experience they have developed a more favorable attitude toward religion, and that religion is a stronger motivating force in their lives now than when they were Freshmen.

(*g*) A variety of religious influences is checked; a few that rank high as being sources for favorable attitude toward religion are: professors and courses, parents, readings, and summer camps.

(*h*) The majority of students (75%) report change in concept of religion during four years of college. The general direction of this change is from formalistic and restricted to a more liberal and encompassing understanding; from subjective, personal, and contemplative to more objective, social and active approach; from reverential and mystic to rational and scientific viewpoint.

2. *Discussion.* Colleges may not only add to a student's knowledge and skills but also help him change his former evaluative attitudes and develop new patterns of values in general harmony with those which a particular college champions and for the implementation of which it provides a distinctive curricular and extracurricular program. In a democratic social organization, with reasonable freedom for the organization and carrying out of differential educational programs, and within the permissive latitude of cultural norms, the development of distinctive value patterns among the graduates of different colleges is possible. A democratic theory of education would, it seems, demand the maintenance of differential educational programs with the consequent distinctive patterns of value, just as a dictatorial theory of education would enforce a uniform educational program resulting in a uniform set of values for all.

It is quite apparent, that during the four year college period almost every student faces serious problems of readjustment in his religious beliefs and attitudes. Under the forceful impact of scientific method and knowledge the student finds it necessary to recast his religious beliefs, some of them rather rigidly set and carrying considerable emotional content. It is certain that the modern college student cannot entertain seriously the Tertullian idea of *credo quia absurdum est.* A rational basis must be found on which to reconcile religious faith and scientific fact. In this difficult task neither the dogmatic scientist nor the dogmatic

religionist will be of much help. Two factors that will facilitate this task and help toward a solution seem to be as follows:

1. A religious education program by parents, churches, Sunday Schools, etc., which from the very beginning of the child's religious development advances religious beliefs in accordance with the level of the child's understanding and in substantial harmony with scientific knowledge.[9] Many dramatic and difficult cases of religious agnosticism and of emotional upheaval occur in persons in whom religious beliefs are too rigid and are too greatly at variance with scientific knowledge, so that contact with the latter often leads to a wholesale repudiation of religion.

2. Religious counseling is an important area of work and provision should be made in colleges for such counseling by persons who have themselves made a reasonable reconciliation between science and religion, and who have achieved in their personal life, in the words of William James, "an assurance of safety and a temper of peace, and in relation to others a preponderance of loving affection" (6).

Bibliography

1. Allport, G. W., and Vernon, P. E. *A study of values. Manual of directions, revised edition.* Boston: Houghton Mifflin Co., 1931.
2. Arsenian, Seth. The relation of evaluative attitudes to vocational interest and social adjustment. *J. soc. Psychol.*, 1943, **17**, 17–24.
3. Bond, Charles M. College student attitudes toward some basic Christian values. *Relig. Educ.*, 1940, **35**, 109–116.
4. Clark, E. T. *Psychology of religious awakening.* New York: Macmillan, 1929.
5. Dewey, John. *A common faith.* New Haven: Yale University Press, 1934.
6. James, William. *The varieties of religious experience.* New York: Longmans, 1902.
7. Katz, D., and Allport, F. H. *Student attitudes.* Syracuse: Craftsman Press, 1931.
8. Kupky, O. (translated by W. C. Trow). *The religious development of adolescents.* New York: Macmillan, 1928.
9. Reisner, Edward H. *Faith in an age of fact.* New York: Farrar & Rhinehart, 1937.
10. Spranger, Edward (translated by P. J. W. Pigors). *Types of men.* New York: Stechert, 1928.
11. Starbuck, Edwin D. *The psychology of religion.* New York: Scribners, 1899.
12. Todd, J. Edward. *Social norms and the behavior of college students.* New York: Teach. Coll. Bur. Publ., 1941.
13. Van Tuyl, M. C. T. A study in student thinking. *Relig. Educ.*, 1937, **32**, 255–262.
14. Van Tuyl, M. C. T. Where do students lose religion? *Relig. Educ.*, 1938, **33**, 19–29.
15. Whitely, P. C. A study of the Allport-Vernon Test for Personal Values. *J. abnorm. soc. Psychol.*, 1934, **5**, 283–297.
16. Young, Kimball. *Personality and problems of adjustment.* New York: F. S. Crofts & Co., 1941.

[9] On this point see both Starbuck (11) and Van Tuyl (13, 14).

A Further Study of the Relation of Time Estimation to Monotony *

Arthur Burton

California State Personnel Board †

In a former paper (2) evidence was presented on the relationship of monotony to the subjective perception of time. Two individual experiments concerned with the same objective but differing in procedure were reported. In the first, an experimental (monotony) group was satiated by first learning, and then continuously overlearning, a triangular pattern on a punch-board maze. A control (non-monotony) group performed the same task but stopped when the criterion of learning was attained. The members of each respective group estimated either the time required to become satiated, or the time required to learn the pattern. Identical conditions were obtained for the second experiment with, however, slight variation: A high-relief finger-maze was substituted for the punch-board maze; the degree of monotony was greater; and the criterion of learning for the control group was increased.

In addition to consistency in the direction of the results of both experiments, it was found when the results were pooled that 87% of the satiated subjects underestimated the time required to become satiated. But no significant underestimation or overestimation was found for the non-monotony subjects.

It is our purpose in this paper to examine further the manner in which monotony influences the subjective perception of time. The following interrogations may be put: Does monotony bias a time judgment in consistent fashion? Is overestimation or underestimation the characteristic error in time judgments with monotony?

Experimental Design

The rationale involved in the experimental design was to present the subject with a simple, repetitive sensory-motor task capable of easily inducing monotony. At intervals, from the start of the task to its final rejection because of monotony, judgments were made by the subjects as to the amount of time spent in activity upon each work interval. From

* This study follows a paper previously reported. Cf. (2).

† The experimental work for this paper was done at the Department of Psychology, University of California, Berkeley.

these data a curve was plotted to depict the error in the estimation of the objective time intervals from a motivated state to one of monotony.

The criterion of monotony—as in former papers—was the rejection by the S of the task toward which he was originally motivated when the rejection was not due to fatigue, toilet needs, need for sleep, etc. In addition, "creative substitutions"—attempts to leave the field by the adoption of irrelevant goals or ideas while persisting physically at the task—motor instability, variability in performance, feelings of monotony, etc., had to be indicated. To make certain that we were dealing only with cases of monotony, the subjects were asked to rate themselves upon a five-point scale as to feelings of monotony, immediately preceding the experiment and directly following its completion. A sample of the rating blank is reproduced below. The S rated himself on Part A without knowing that he would be required to rate himself on Part B when the experiment was completed.

Name.....
Number.....

A

Encircle the word that *best* describes your feelings or condition at this moment.
(1) highly bored.....bored.....neither bored-eager.....eager.....highly eager

B

Encircle the word that *best* describes your feelings or condition during the last three minutes of your work.
(1) highly bored.....bored.....neither bored-eager.....eager.....highly eager

C

(1) On the reverse side describe in detail your feelings of monotony.
(2) At the bottom of the reverse side relate in detail why you stopped working when you did.

The S's for this experiment were 54 students enrolled in the beginning psychology classes at the University of California, Berkeley. Selection was random since S's were chosen by arbitrarily drawing individual cards from the total registration of the class. Those subjects who were reluctant in any way to participate were excused. The sample represents 19 males and 26 females, the data of 9 S's having been discarded for reasons to be given below. The experiment was conducted in small groups ranging from 2 to 6 persons.

Following preliminary exploration with various tasks, the geometrical designs shown in Fig. 1 were devised. A mimeographed page of 325 zeros was provided for each of the 20 designs. These zeros were symmetrically arranged in columns covering the entire page. Each design had to be superimposed upon a page of zeros (325) until 20 designs or pages were completed, or until the subject volunteered that he wanted

to stop. Fig. 2 is an illustration of the process of superimposing designs upon zeros. The design in question is No. 6.

The S's were segregated from each other as far as the physical conditions of the room permitted, and all objective aids, *e.g.*, watches, were removed. Part A of the rating blank was then administered. The true nature of the experiment was disguised by informing the S's that this was a study to determine the accuracy with which one geometrical figure could be fitted upon another. The designs were presented visually as they appear in Fig. 1, but enlarged ten fold. Errors in drawing the designs were explained and illustrated as: (1) loss of angle, (2) overlapping of figures, (3) straight line made curved, (4) corrections, (5) one

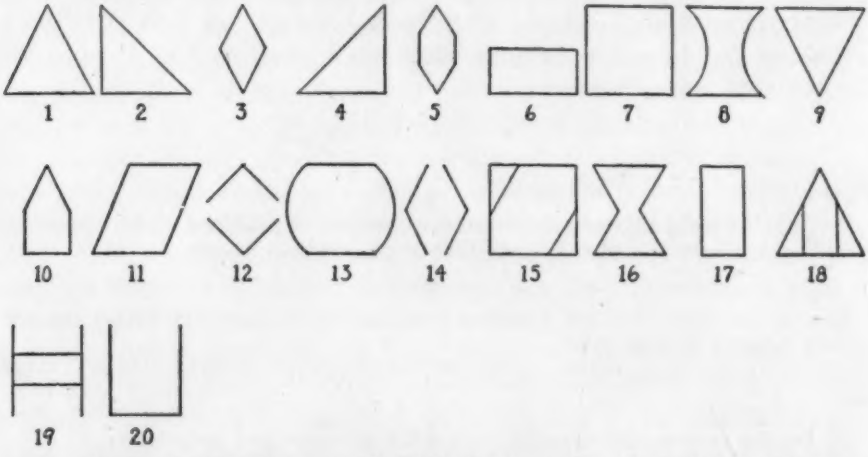

FIG. 1. Geometrical designs employed in the experiment. Errors: (1) loss of angle, (2) overlapping of figures, (3) straight line made curved, (4) corrections, (5) one figure converted into another, (6) touching any part of zero.

figure converted into another, and (6) touching any part of the zero. Borderline cases were demonstrated. The S's were permitted to practice upon one-half of a standard page using a sample design. It must, of course, be clear that the accuracy with which the designs were drawn was only of secondary importance in pursuing the objectives of this study. It was our desire to induce monotony upon a legitimate task but to give no indication that monotony was the objective. Defining the exact objective of the experiment might have induced the S's to infer that capacity for work or endurance was being measured and they might have persisted beyond the point of simple monotony. The accuracy of drawing was stressed for this reason.

The S's were told that the total number of accurate designs drawn would be their score. "Although errors might be more frequent later

on, the number of correct designs would also increase and thus serve to raise your rank in the group. *You can, however, stop at any time whether*

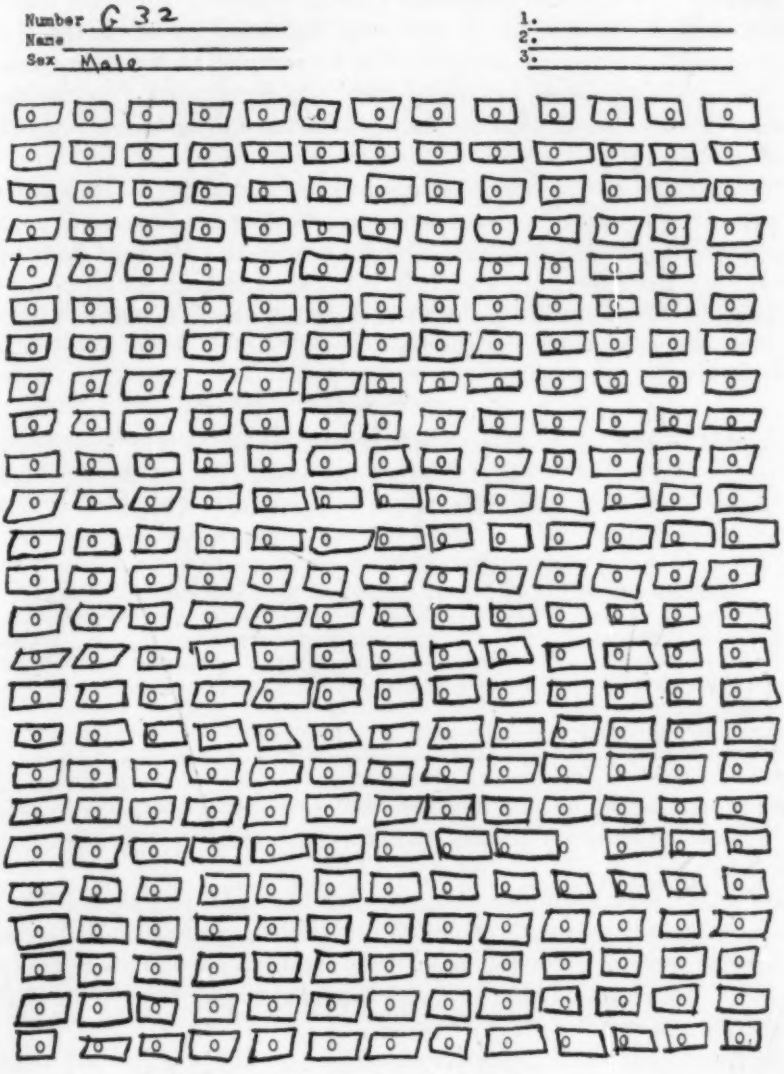

FIG. 2. Illustration of the process of superimposing design number 6 upon the zeros.

on the first design or on the last, since this is perfectly permissible. Whenever you feel that you do not want to, or cannot go on, bring your paper up."

The first design was shown simultaneously to all the S's and then they were told to begin. Thereafter they came up individually to the

desk as soon as they had completed the page (design). The S was asked: "How long did it take you to complete this page? Give your immediate impression." When the estimated time to complete the page and the objective time required to do this page had been recorded, the S was started on the next page (design). On its completion he again came to the desk. This process continued until the S reported that he didn't care to do any more. Parts B and C of the rating blank were then administered.

Social influence was kept at a minimum by asking the S's who satiated early to write a "story" around certain of the Morgan-Murray Thematic Apperception pictures (8). In this manner all the S's were kept busy throughout the experiment and all left the experimental room at the same time. Communication between S's was not permitted and no one left the room except for emergencies.

Results

Sixteen of the subjects reported 'eager' and 29 neither 'bored-eager' before the start of the task; following the task, 11 were 'highly bored,' 25 'bored,' and 9 neither 'bored-eager' (Table 1). The data of the 9

Table 1

Subjective Report of Monotony Before and After Experimental Task

	Highly Bored	Bored	Neither Bored-Eager	Eager	Highly Eager
Before task....			29	16	
After task.....	11	25	9		

subjects who failed to rate themselves 'bored' or 'highly bored' after the task were discarded despite conformance to the established criteria of monotony.

The mean time to induce monotony for the entire sample was 102.93 minutes with a range from 31.27 to 165.22 minutes. Individual differences were particularly pronounced in the time required for the S's to become satiated. The mean number of pages (designs) completed was 6.4 (2,080 zeros) with a range from 2 to 15 pages.

By comparing the time estimations for the first design—no subject was bored upon the first design since all went on to the second—and the estimations on each S's final design where the task was rejected, some index of the influence of monotony on time estimation can be obtained by the degree and direction of the difference score. These data are given in Table 2. It can be seen that when the S's were motivated (initial design), they *underestimated* the objective time interval by an average

Table 2

A Comparison of Initial Design (Non-Monotony) with Final Design (Monotony)*

	Initial Design (Non-Monotony)				Final Design (Monotony)			
	Av. Perf. Time	Av. Est. Time	Diff.	Per Cent Error†	Av. Perf. Time	Av. Est. Time	Diff.	Per Cent Error †
Mean....	15.33	13.42	−1.91	−12.45	17.23	17.90	.67	3.89
$S.D._{Dis.}$..	4.68	6.93			7.73	10.04		

* In minutes.

† Mean percentage over- or underestimation of mean objective time interval.

of 1.91 minutes or 12.45%. When they were bored (final design), they *overestimated* the objective time interval by .67 minutes or 3.89%, on the average. However, this difference was not statistically significant since the critical ratio was only 1.09.

Twenty-six or 58% of the total group of S's *underestimated* their respective intervals on the first design (non-monotony); 19 or 42% *overestimated* it (Table 3). But 21 or 47% *underestimated* the time interval on their final design (monotony) and 24 or 53% *overestimated* it. These proportions were likewise found to be statistically unreliable.

Table 3

Time Estimation Error from Initial to Final Design*

Design	N	Mean Perf. Time	Mean Est. Time	Mean Diff.†	Number Overest.	Number Underest.
1	45	15.33± .70 min.	13.24±1.03 min.	−8.2%	19	26
2	45	17.31± .70	15.93±1.08	−6.6	18	27
3	43	16.15± .68	17.08±1.14	11.11	23	20
4	40	14.09± .83	14.69±1.06	8.42	22	17
5	37	21.72±1.02	21.18±1.52	−1.00	17	20
6	24	13.67± .89	12.88±1.04	−1.37	9	15
7	19	10.73± .65	10.9 ± .99	5.52	9	10
8	17	14.96±1.28	14.76±1.25	3.17	9	8

* No data beyond design 8 are presented for reasons of small sampling.

† Minus quantity denotes underestimation; plus quantity, overestimation.

A curve representing successive judgments of time from initial motivated activity to monotony should indicate some degree of rectilinearity if monotony biases time judgments consistently in favor of over- or underestimation. Table 3 lists the mean performance times and mean estimations of these performance times for the grouped S's on each design. The mean percentage difference between performance and estimated time was found by calculating the percentage difference for each individual's

estimation, and then averaging the composite percentages to give an index of the under- or overestimation for each design. These means are listed in column 5 of Table 3 and have been plotted as a curve in Figure 3. The secondary abscissa in Figure 3 gives the number of cases upon which the plotted points are based. The deviation in estimated time from the objective time for the first design was an underestimation of 8.2%. With increasing activity, the underestimation error becomes positive, and then slightly negative again. The 7th, 8th, 9th, and 10th designs then show

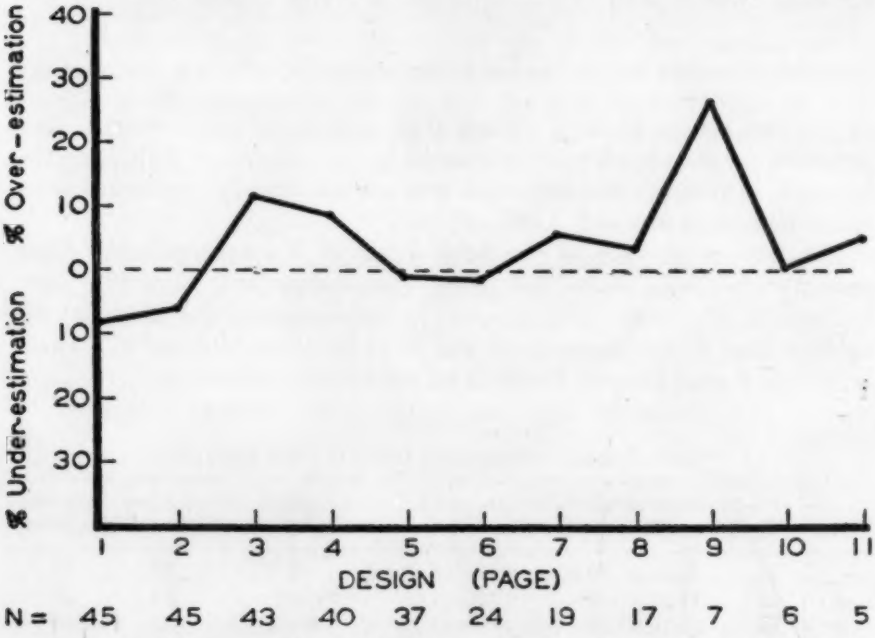

FIG. 3. Mean percentage estimation error from motivation to monotony.

overestimation. The number of S's underestimating and overestimating for each design is also given in Table 3.

To indicate the high degree of variability and the personalistic nature of the time judgments, selected but representative cases have been plotted in Figure 4. It is clearly evident that some S's underestimate consistently as monotony succeeds motivation, whereas others overestimate consistently.

Discussion of Results

The rationale of this study is based upon two lines of evidence: (1) a comparison of time judgments in a monotonous state (final design) with those made in a motivated state (initial design), and (2) the determination of direction and consistency of estimations by plotting the mean

judgment error for successive interval designs from motivation to monotony.

The evidence from the first category of rationality indicates that with an absence of monotony, 58% of the S's underestimated the time interval required to complete the initial page, whereas only 56% overestimated a comparable interval when satiated. Prior to monotony an average time underestimation of 12.45% of the objective interval was found, but with monotony the judgment error is an average time overestimation of 3.89%.

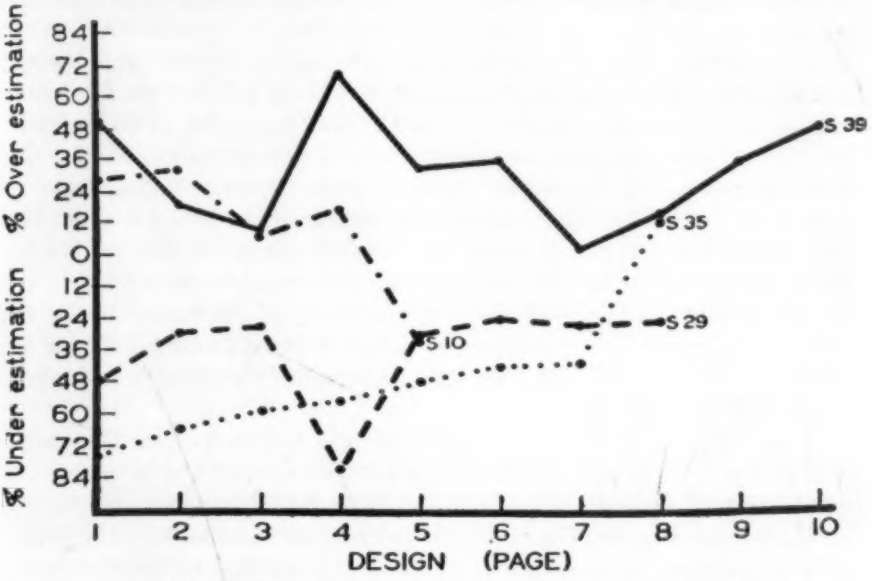

FIG. 4. Individual differences in time estimations from motivation to monotony.

Unfortunately, these differences are not great enough to be statistically reliable, and no true difference can be said to exist.

The second line of evidence—the mean percentage time judgment error for each design (page)—shows no rectilinearity, *i.e.*, increasing increments of monotony do not add proportionately increasing increments of overestimation or underestimation or objective certainty. Initially there is a general tendency toward underestimation which changes to overestimation, and is then followed by slight underestimation which finally shifts to overestimation from the 7th to the 11th design.

If designs 9 to 11 are ignored (Fig. 3) on the grounds that the means are based upon only 5 to 7 cases, then it appears that our subjects underestimated time when they were motivated and showed a tendency toward overestimation as they worked more and more toward monotony. With 8.2% underestimation on the first interval as a base, the percent varia-

tion toward overestimation is as much as 19.3% (2.98 minutes) and as little as 6.83% (1.05 minutes). As stated above, however, no regular linear trend appears.

These findings which are based upon average time judgments must be tempered by the fact that in every case the proportion of S's overestimating and underestimating is not far from equal, and only in one case does it reach as high a ratio as 37–63%.

When the individual time judgment curves are examined, it is apparent that monotony has not exerted a uniform influence upon temporal perception. A hierarchy of heterogeneous effects is more the rule. Such evidence bears out the contention formerly noted that multiple factors are operative when a temporal judgment is given and the resulting estimation error depends upon the particular biases impinging at the moment. It then becomes relatively valueless to seek a generalization which holds forth a promise of consistent group trends in time estimation with monotony. The intimate variables surrounding the perceptive act and the individual perceiving must be experimentally qualified. Harton (3, 4, 5) has shown that success and failure, the degree of unity (*i.e.*, the character value of the goal), and the difficulty of the task all influence a time judgment. The personalistic nature of these factors illustrate the difficulty of assuming and defining a consistent influence of monotony upon temporal judgments.

One difficulty in studies dealing with time estimation is a compensation factor. When an individual is asked to estimate the time spent in an activity of some duration, and in addition the normal perception is biased by some impinging factor, as for example, monotony, the immediate impression, when extreme, is rationally corrected to conform to the objective events in the surrounding field. As an illustration, one S remarked: "It feels like 3 hours, but that can't be right, so I'll say 30 minutes." This may occur in spite of directions to give immediate impressions and the removal of all possible objective aids. Our observations indicate, however, that with the precautions taken, such errors were of infrequent occurrence in this study.

It is difficult to explain the preponderance of underestimation of time with monotony found in our earlier study as compared with the slight tendency of the subjects to overestimate on this study. It is probable that variations in experimental conditions, *e.g.*, the nature of the tasks, the size of the time interval to be estimated, etc., as well as the personal factors of success or failure, the goal set by the individual for himself (3, 4, 5) and others are responsible for the varying results found, and may be factors in the lack of agreement between the studies reported in the literature (1, 6, 7, 9, 10). Further research in this field might well be directed toward isolating the relevant factors governing a time judg-

ment under conditions of monotony and ignore the question of over- or underestimation of time as characteristic of monotony. Only when this has been attained, will a theory of monotony based upon temporal perception bear fruit.

Summary

1. Under the experimental conditions represented here, a group tendency toward overestimation of time was noted when the mean time estimation for successive work intervals from motivation to monotony were plotted.

2. A comparison of time estimation in motivated and monotony states revealed that a difference in favor of overestimation with monotony was not sufficiently large to be statistically significant.

3. Individual time judgment curves for successive work intervals from motivation to monotony revealed that under conditions of monotony an individual may underestimate or overestimate time.

4. The lack of consistency in the findings reported in the literature, and the differences found in the present two studies invite the conclusion that monotony exerts variable influence on temporal perception and variegated experimental conditions produce diverse results.

5. A theory or criterion of monotony based upon total consistent trends in time estimation and in the operation of a single causal factor in judgments of time does not seem to be warranted.

6. Research on the question of over- or underestimation of time as characteristic of monotony should be made ancilliary to the delineation of the variables governing a time judgment in general, and under conditions of monotony in specific.

References

1. Barmack, J. E. Boredom and other factors in the physiology of mental effort. *Arch. of Psychol.*, N. Y., 1937, No. 218.
2. Berman, A. The relation of time estimation to satiation. *J. exp. Psychol.*, 1939, **25**, 281–293.
3. Harton, I. J. The influence of the difficulty of activity on the estimation of time, II. *J. exp. Psychol.*, 1938, **23**, 428–433.
4. Harton, I. J. The influence of the degree of unity of organization on the estimation of time. *J. gen. Psychol.*, 1939, **21**, 25–49.
5. Harton, I. J. An investigation of the influence of success and failure on the estimation of time. *J. gen. Psychol.*, 1939, **21**, 51–62.
6. Hoche, A. Langweile. *Psychol. Forsch.*, 1923, **3**, 258–271.
7. Lossagk, H. Experimenteller Beitrag zur Frage des Monotonie-Empfindens. *Ind. Psychotec.*, 1930, **7**, 101–107.
8. Murray, H. E. *Explorations in personality*. New York: Oxford University Press.
9. Thompson, L. H., Jr. Measuring susceptibility to monotony. *Personnel J.*, 1929, **8**, 172–196.
10. Wyatt, S., Fraser, J. A., and Stock, E. K. L. The effects of monotony in work. *Indust. Fat. Res. Bd. Rep.*, 1929, **56**.

Some Comments on Dr. Tinker's Review of "Reading as a Visual Task"

Matthew Luckiesh

Director, Lighting Research Laboratory, General Electric Company, Nela Park, Cleveland

In the February (1943) issue of this journal, Dr. Miles A. Tinker reviews a recent book by myself and Frank K. Moss, *Reading as a Visual Task*. Some of his statements are so obviously at variance with some important facts that I am impelled to make a few brief comments.

In the preface we stated that the "results presented herewith are confined chiefly to the authors' work and entirely to reading as a visual task." As authors we have the right to establish our own ground rules. This disposes of some of Dr. Tinker's criticisms.

Dr. Tinker states that the authors "admit" that high visibility does not always guarantee high readability. In this we merely state a fact. Visibility is easy to measure just as blood-pressure is, and one of our objectives has been to find the limitations of visibility measurements and be guided by them just as the physician is guided by the limitations of blood-pressure measurements. Dr. Tinker does not even "admit" that rate of reading as a criterion of readability is of questionable value. He accepts it as a suitable criterion without suspicion or proof.

A major objective of our researches for more than three decades has been to discover a criterion which would measure ease of seeing or in the case of reading, what we have termed readability. As a consequence, we have prosecuted extensive researches in the realm of physiological effects of seeing. With the technique which we have developed, the rate of involuntary blinking has yielded very promising results. Certain "axiomatic" researches indicate with surprising consistency a qualitative relationship (which is sufficient for our present objectives) between decreasing blink-rate and increasing readability—ease of reading. Dr. Tinker completely ignores the extensive coordination and apparent consistency of our results of a decade of researches involving the rate of involuntary blinking and nearly two score researches dealing with a variety of variables. Dr. Tinker not only ignores this voluminous work, but continues his practice of stating that "other experimentalists have concluded that the rate of blinking is not a valid index of visual fatigue." He produces no references and I challenge him to reveal any published

work of adequate or even reasonable magnitude which, by the use of our technique, successfully challenges our long series of experimental results. Actually nothing comparable has been published and he should be aware of this—and is.

Dr. Tinker clings to rate of reading as a measure of readability. He merely assumes it to be. He has published no results which prove this. For many years we have obtained data on the rate of reading or of doing useful work. Finding this criterion insensitive—as Dr. Tinker's own work proves—and being unable to accept it as a criterion of readability—or of ease of seeing—we continued our search for other criteria. Dr. Tinker's own work, for example, the book of which he is co-author—*How to Make Type Readable*—contains adequate proof of the insensitivity of rate of reading. Incidentally, that book is unaccountably devoid of analyses of his data as to reliability. Probable errors are notably absent. At least we do include this desirable information which Dr. Tinker ignores in his criticism of our work as he does in the publication of his work.

Dr. Tinker also fails to grasp the desirability of a criterion over which the subjects cannot exercise much, if any, control. This is not true of the rate of reading, and is true to a great extent of the rate of *involuntary* blinking. This is an extremely important and desirable characteristic of a suitable practicable criterion.

Dr. Tinker knows, or should know, that no work on the heart-rate during reading has been done which is comparable with ours. The only published data that I know of deal with basal heart-rate. Before that work was done, I urged against the use of basal heart-rate. In those results the highest heart-rate was of the order of the lowest heart-rate in our research. When the heart-rate is the lowest that is at all normal, can one expect it to be depressed much further by strain or anything else much short of death?

As to geometric or arithmetic means, I can only repeat that at least we make it a practice to present probable errors in important cases while Dr. Tinker appears to be little acquainted with them in his own work. After all, the inclusion of probable errors is an indication of open-mindedness and honesty.

Space does not permit discussing seven enumerated criticisms which Dr. Tinker included. I disagree with most of them and if our book is read with an open mind, I believe more persons will agree with our conclusions than with Dr. Tinker's obvious prejudices and apparent lack of understanding of subjects with which I have spent a lifetime and with which he has not. In these comments he exhibits a disregard for relative reliability of the data. He also exhibits a lack of familiarity with some of the fundamental facts. At any rate, we have presented the results of

extensive researches which are a continuance of several decades of work. Dr. Tinker has shown gross ignorance of such fundamental factors as brightness, illumination and lighting conditions. At least our life-long association with these fundamental aspects of seeing conditions is a guarantee of high control and adequate recognition of these factors which are commonly absent in Dr. Tinker's criticisms as well as his work.

From long experience with visual tasks and researches dealing with the effects of controllable aids to seeing, I considered it a duty to provide a chapter in which are summarized our ideas of specifications for optimum readability. In these I was guided by all the facts which were available. In cases where they were not adequate, we have made this adequately clear. In such a complex subject, it will be a long time before data are complete. At any rate, our specifications are presented for what they are worth and with no dogmatic adherence to the past or over-emphasis of a relatively insignificant fact or factor.

Finally, Dr. Tinker's attitude is revealed by his criticism that our book was printed in 11-point type, 23-pica line-length, 2-point leading, on moderately glossy paper. I submit that the typography is unusually good for a technical book. Dr. Tinker seems to think that the typography should have represented what we would conclude as ideal. He seems to ignore the fact that most products of mankind—buildings, bridges, books—are compromises of various factors. Eleven-point type approaches the ideal in size and practicability. Two-point leading is fairly satisfactory and is a compromise with space considerations. A shorter line-length appears from our work to be ideal, but would it be in a book in which the pages are so generally broken with illustrations and tables? Dr. Tinker's book with a far more ambitious title—*How to Make Type Readable*—does not exemplify his conclusions as to typography. Perhaps he too realizes that publishers have some rights.

And the paper in our book is not "moderately glossy." It is unusually dull—which this discussion would certainly not be if I were not considerate of space, paper, editor, and publisher.

Received June 14, 1943.

News and Notes

The January, 1943, Quarterly Report of the Worker-Analysis activities carried on by the Occupational Analysis Section of the U. S. Employment Service shows that 1165 offices in 46 states, the District of Columbia and Hawaii are utilizing, to varying degrees, the research findings devoted to job families, typing and stenographic tests, trade questions, and aptitude test batteries.

Job families to the number of 194 have been completed and 25 are in process for occupations, industries, military occupations, and special cases. Work on job families for the physically handicapped is also being done with 17 completed and 3 in process. Analysis of 8,154 occupations in 88 industries provides the basis for this work.

Trade questions have been developed for 171 occupations and are being developed for 132 additional occupations.

The extent of the work in the development of aptitude testing is indicated by the fact that 55 aptitude tests (pencil and paper) and 6 apparatus tests have been built from which a total of 110 aptitude test batteries have been standardized.

The extent to which these employment methods are being used is indicated by the fact that Job Families have been introduced into local offices in 514 cities in 36 states, Typing and Stenographic tests in 378 cities in 40 states, Trade Questions in 1103 cities and 46 states, and Aptitude Test Batteries in 390 cities and 42 states.

Coincident with the arrival of the first books purchased from the June E. Downey Library Fund the faculty of the Department of Psychology and Philosophy of the University of Wyoming, in conjunction with the University of Wyoming Chapter of Psi Chi, national honorary society in psychology of which Dr. Downey was a charter member, announce the dedication of a psychology seminar in honor of Dr. Downey.

The dedication ceremonies took place on May 9, 1943, at the University of Wyoming. Dr. Richard Uhrbrock, Director of Industrial Relations of Proctor and Gamble and who for a number of years was a member of the Department with Dr. Downey, gave the main address in commemoration of Dr. Downey and her many contributions to psychology.

Lieutenant L. J. Lennon, formerly guidance counselor in the Technical High School at Scranton, Pennsylvania, reports that a study made

while he was guidance counselor indicated that scores on the Iowa Silent Reading Test Form A of applicants for admission to a nurses' training school in northeastern Pennsylvania showed little relationship with subsequent class grades although the group of students with the higher initial reading scores also had higher class grades at the end of the first year in the training school.

The 1942 Annual Report of the Psychological Corporation, 522 Fifth Avenue, New York City, is an attractive and informative twenty-page resumé of the far-flung activities of this enterprising group of professional psychologists and their group of some 200 cooperating psychologists located throughout the United States. The work is carried on by five divisions, namely, Marketing and Social Research; Industrial Division; Test Division; Testing Service Division for Schools of Nursing; and the Psychological Service Center.

The Marketing and Social Research Division, directed by Henry C. Link, made 63 separate studies for 39 different clients (manufacturers, advertising agencies, government agencies, etc.). The Quarterly Psychological Barometer, which was begun in 1932, is now the oldest continuous poll of public opinion and buying habits now in existence. The November, 1942, survey was the fifty-seventh in the series now totalling 332,000 personal interviews.

The work of the Industrial Division, directed by Richard A. Fear, was greatly expanded during 1942 because of a demand from war industries for consulting services in the development of improved methods of employee selection, upgrading and training of workers, and more efficient utilization of manpower. A number of new industrial selection tests were devised and validated.

Dr. George K. Bennett who directs the work of the Test Division reports that the relative demand for various types of tests has shifted from guidance tests to mechanical ability tests of value in industrial selection programs. The policy of refusing to sell tests to organizations who do not have trained personnel to administer and interpret test results has continued.

The Testing Service Division for Schools of Nursing, directed by Edith Margaret Potts, reports a steady increase in the number of nursing schools for whom selection testing is conducted. In 1942, a total of 11,956 applicants were tested for 240 nursing schools in 31 states. In addition, 240 cooperating psychologists tested 4061 applicants in widely scattered parts of the United States.

The Psychological Service Center, directed by Dr. Rose G. Anderson, maintained a high level of professional service in providing clinical

counseling (educational, vocational, and personal) for 192 adults and adolescents.

A final section of the report is devoted to a description of the varied activities carried on by the Chicago Office which is directed by Dr. Arthur W. Kornhauser.

Dr. Alice I. Bryan, Secretary of the I. C. C., submits the following news item:

"An Intersociety Constitutional Convention attended by twenty-six delegates from nine national psychological organizations was held in New York on May 29–31. Organizations sending delegates were the American Psychological Association, the American Association for Applied Psychology, the Society for the Psychological Study of Social Issues, the Psychometric Society, the Society of Experimental Psychologists, the National Institute of Psychology, Section I of the American Association for the Advancement of Science, the National Council of Women Psychologists, and the Department of Psychology of the American Teachers Association. The convention was called to order by Dr. Robert M. Yerkes, chairman of the Survey and Planning Committee, a subcommittee of the Emergency Committee in Psychology of the National Research Council. Officers were elected as follows: Edwin G. Boring, chairman; Alice I. Bryan, secretary; Ernest R. Hilgard, vice-chairman; Edna Heidbreder, vice-secretary. The purpose of the convention was to consider proposals for closer cooperation among existing psychological societies in the furtherance of their scientific and professional aims, with special reference to facilitation of the war effort and the promotion of national welfare in the post-war world. At the close of the convention, Ernest R. Hilgard was appointed chairman of a continuing committee charged with the task of framing proposals adopted by the delegates for submission to the members of the participating societies. It was the sense of the convention that 'the objectives in view can be most effectively and economically achieved through a closer and more organic tie between the reconstituted present national psychological societies and their present affiliates.'"

The New Orleans Child Guidance Clinic will have an opening this coming fall for a psychological extern. This position will offer to an advanced student of clinical psychology an opportunity to participate in the usual clinic activities with the added experience of taking part in community relationships through collaboration with a group work agency. Interested individuals should contact Miss Hazel Long, Psychologist, The Guidance Center, 1737 Prytania Street, New Orleans, Louisiana.

J. Gustav White reports that a group of eighteen professional consultants in the Los Angeles Metropolitan area organized the Coterie of Counselors in 1940. Membership has been limited to two representatives from each of the following classifications: Psychiatry, General Medicine, Applied Psychology, Pastoral Counseling, Institutional Chaplaincy, Education, Family Relations, Social Work, Legal Aid, Vocational Counseling, and Industrial Personnel. Among topics considered have been: Imbalance in Body Chemistry, Explaining Aberrations in Behavior; Procedures in the Treatment of Alcoholics, Characteristic Techniques of Freudian, Adlerian, Jungian Psychology; Counseling Methods Adapted to High Schools, Army Camps, Induction Centers, USO centers, YWCA, Probationers, the Physically Handicapped; and Legal Counseling.

Book Reviews

Fry, C. C. (with the collaboration of Rostow, E. G.). *Mental Health in College.* New York: The Commonwealth Fund, 1942. Pp. xix+365.

Ten years experiences in college psychiatry are reported largely through short case histories in this volume. It tells of the activities of twelve psychiatrists and their assistants in the Division of College Psychiatry and Mental Hygiene of the Department of University Health at Yale. In addition to the origin, history, personnel, organization, policies, and the educational value of the division, Dr. Fry discusses the staff's experience with such practical matters as: how to stimulate the students who need the service to seek it voluntarily, length of therapy, resistance to treatment, relationship to the patient's parents, and the range and nature of the problems presented.

The major problems as the author sees them are reflected in the organization of the volume beyond the introduction. They are: Part two—"*Problems of Personality Growth*" (the two chapters devoted to this are "Family Relationships" and "Sexual Growth, Behavior and Attitudes"); Part three—"*Reactions to the Undergraduate Environment*" (which consists of "The Undergraduate School," "Scholastic Adjustment" and "Social Adjustment"); Part four—"*Special Problems*" (comprising the disparate topics "The Graduate & Professional Schools" and "Serious Disorders").

The relationship of physical symptoms to emotional, social, and developmental problems in youth is a major contribution of the study as one might expect. Partially because of the clinical source of the data, the findings yield patterns and possible trends rather than conclusive generalizations. It is regrettable, because of their research value, that standard fact-finding blanks are not used by clinicians more often along with other more flexible techniques. In spite of the inherent difficulties in the clinical situation the author does not take too much advantage of the opportunity to make his results more definite. Rarely does he distinguish between hypothesis, tentative generalization, and established fact. Nor does he give frequencies (which might have been obtained from case records) to indicate the reliability of the generalizations he makes. The reader must accept them and guess as to whether they are definite and consistent or merely clinical impressions. For example, in the case of the following statements it would be well to know the relative frequencies with which these phenomena occurred: "Even when dependent individuals succeed in getting married the problem (dependency) is

not solved but often aggravated" (p. 59). "The students who felt rejected by their parents experienced feelings of insecurity and inferiority" (p. 83). "Whether in submission or revolt the student experiencing maladjustment in the family relationship usually practices some form of immature sexual behavior" (p. 120). This tendency is not because the author objects to statistics since percentages are given occasionally in the book to substantiate generalizations, for example on (p. 119) and (p. 256). Psychiatry and clinical psychology, also, will grow in the respect of both medical colleagues and biological and social scientists when more clinicians assume increased objectivity and a more scientific attitude. These attitudes are intimately bound up with a keener unpatronizing cooperation with related disciplines. Psychiatry can well afford to borrow techniques which are being perfected in related sciences.

There are no references to similar work at other institutions for comparison or confirmation of trends. Neither does the author orient his techniques or generalizations to the theoretical or technical literature. The presentation is not on a highly technical level. In some cases, specialists in this field will doubtless raise many questions calling for elaboration of this report. The broadest generality is found in a discussion of therapy. Whereas most of the cases presented are rather detailed as to symptoms, family relationships, social life, sex, development, most pertinent attitudes and traits, the "treatment" is most brief. Often in a sentence the author says the student gained insight, or that treatment consisted of assurance and information, or that the patient was seen over a period of time. The reader must determine the extent to which the directive and nondirective approaches were used. The statement "was given insight" might either mean that the doctor discussed the matter and gave information and advice to the patient or that he encouraged the patient while the patient talked through the problem. From the author's brief discussion of treatment as the "removing of false ideas," "giving the student factual knowledge," and "probing," it seems his approach is directive in emphasis.

Hysteria seemed to be absent among these cases. Neither it nor the other "psychoneuroses" are cited in the index. Homosexuality and the fear of it, family relationships as problems, and social adjustment are given considerable emphasis. None of the material is essentially novel to the clinical psychologist and psychiatrist with training and experience in college adjustment problems—except possibly the superior discussions of serious disorders among collegians. The brief section on suicides in college is indeed worthwhile.

Dr. Fry has made a contribution in his grasp of the relation of emotional disturbances to the specific conditions of the Yale *milieu*. In fact

the book might more accurately be entitled, "Mental Health at Yale." College adjustment is viewed broadly in terms of academic, social, and inner adjustment.

The reader is shown, for example, how a family problem arises because an "old" family attempts to direct the life of the male heir or because a bright youth of immigrant parents feels out of his element. The strong group prevalence of the double sex standard for girls of better families or the boy's tendencies to turn to "girls of a lower social class" for lustful gratification is depicted. The effect of the highly competitive striving for a small number of senior society memberships is delineated clearly.

Dr. Fry states that the object of the activities of their staff is educational, that they strive to give the student perspective, that emotional difficulties are common problems of adolescent growth and social adjustment, that his patients are mostly normal boys, who are first examined by the health service physicians, that in 42.7% of the freshman cases studied 'scholastic problems' were of major prominence, and that only 8% of the cases were serious or psychotic,—nevertheless, unlike the situation in some institutions, the role of the clinical psychologist as reported here is a minor one. The brief specific description of the admittedly good work of the psychologist is given in a footnote and in the Preface. This brevity is evidence that psychologists have been unsuccessful in acquainting psychiatry with the scientific and technical value of their trained men and methods. It argues for emphasis on greater cooperation between psychologist and psychiatrists. It may be stated in passing that the work of other professional assistants without M.D. degrees is given little space in this report.

A clear description is given of the "College Plan" which has been in effect since 1933–34 and its adjustmental implications. Although it has remedied many of the deficiencies of the old *laissez-faire* system it has not removed all the environmental obstacles to an easy adjustment.

Psychologists interested in student emotional adjustments as well as educators interested in the relationship of campus life to personal development will want to add this book of cases and this discussion of campus life from an adjustmental standpoint to their collection.

FRED MCKINNEY

University of Missouri

Watkins, John Goodrich. *Objective Measurement of Instrumental Performance.* New York: Bureau of Publications, Teachers College, Columbia University, 1942. Pp. 88 + Append. $1.60.

Dr. Watkins painstakingly seeks for a measuring device to be used for the evaluation of playing ability on a musical instrument. The

extremely methodical approach is no doubt due to the institutional requirements of the doctoral thesis which the book represents. He calls attention to the general acceptance of the consideration of musical ability as an innate capacity and deplores the lack of criteria for achievement other than teachers' marks which are known to be quite unreliable. The few sporadic attempts in the construction of achievement tests were found limited to sight-singing and vocal performance, and the evidence indicates that no group test of musical achievement has as yet been constructed with the degree of reliability necessary for individual differentiation.

It would have been desirable to indicate in the title of the book the fact that the test is limited to the playing on the cornet. This is especially true because of the wish of the author for real scientific objectivity.

The study has two major objectives: (1) To determine the possibility of measuring objectively achievement on a musical instrument. (2) To find out, in a group of performers on this instrument, the relation existing between sight-reading ability and technical skill after various periods of study.

The author admits that there can be no argument with the artist who insists that much, much more than the two traits, sight-reading ability and technical skill, is necessary; that good interpretation is a vital part of successful performance. He does nothing more about it, however, for he feels that interpretation does not lend itself to objective study. He quotes his major adviser, James L. Mursell, in saying that "it is a great fallacy to suppose that there is some one optimum or ideal interpretation set by the composer." The test is, therefore, limited to what is termed "sight performance and practiced performance on a musical instrument."

The "omnibus" musical psychologists gingerly apply their little hammer on the "atomistic" approach of the Seashore coterie, and in consequence it appeared desirable to develop a test which involved the reading and performance of whole melodies rather than isolated snatches of music. The reasons for the selection of the musical instrument to be used in the investigation were rather naive. Instruments with extreme range were excluded as well as the Violin and Trombone, which would introduce another element of subjective judgment involving correct pitch. Yet, the musician would be very apt to consider fine pitch discrimination a very important factor, even in an instrument with valves, like the cornet. It must be admitted that the adjudicator, as well as the candidate being tested, might find this element of pitch a trying one. The "psychological intonation" resulting from "tendency tones" in a melodic

line are admittedly highly subjective, but are truly meaningful. It is regrettable that the pitch factor was eliminated.

The construction of the performance test for the cornet was handled very carefully and purposefully. Recent methods for the instrument, published in America, were submitted to school music instructors and private teachers of the cornet, to ascertain which of the methods were most widely used throughout the country and how long the average student took to complete each of them. This gave some idea of the sequence of the introduction of the symbols of musical notation. The question as to what constitutes difficulty in music came constantly to the foreground when the preliminary forms of the test were being developed. It was assumed that the principle of negative acceleration would obtain in the learning of sight-reading in music. It was later found, however, that this condition was not as pronounced as was proposed. Four approximately equivalent forms of the test were constructed, and each form was arranged in order of difficulty by the combined rankings of qualified judges.

The scoring system, avowedly simple, involved thorough understanding and considerable practice on the part of the tester. The musical measure was adopted as the scoring unit, *i.e.*, a measure was counted wrong if any error occurred within it. Such errors were carefully defined in the instructions to insure objectivity of scoring. Yet there were found to be a number of controversial points in the scoring system. One rule especially provokes the musician's good-natured smile, namely, that "Pauses between measures, no matter how long, do not constitute errors. However, do not inform the student of this fact." Another bit of instruction: "Tones badly out of tune were not counted as errors if the correct partial and not an entirely different tone was sounded."

Testing with the preliminary forms offered determination of the difficulty levels and the selection of the final forms of the test. It is judiciously observed that "measures are not independent of each other," in substantiation of which it is remarked that "as the organismic psychologists have pointed out, the figures or elements in any psychological field are conditioned by the whole." In explanation it is pointed out that "the field, in this case the melodic structure, has a retroactive effect on its components, the measures." K. L. Bean is quoted in the conclusion that a Gestalt is involved in the reading of music and that an organismic interpretation is desirable when experimenting with melodies." It seems almost unbelievable that this same thought is not applied to the measurement of performance by the adjudicator. No provision is made for it whatsoever.

It is wisely remarked that most human skills seem to be distributed

normally among the population, but it might be questioned whether all those who have the proper lip contour and musculature for a desirable cup-mouthpiece instrument take up the cornet or some other member of that family. A like assumption is made with reference to sight performance ability on the cornet being normally distributed. In the relation of sight performance to practiced performance, it was found that sight-reading ability develops at a rather rapid rate for the first two years, after which it has a tendency to progress at a slower rate. Technical skill, on the other hand, although it develops at an even faster pace for the first two years, slackens thereafter, so that the progress is about the same as in sight-reading. This would seem to indicate that there is considerable stress placed on technique by the teachers of beginning pupils. And now come some sad admissions, in that "above five years the shape of the curves is not reliably determined," and further, "there is a wide variation in the abilities of different students after any particular period of study, some having progressed two or three times as fast as others."

The overview and summary offer some pertinent suggestions: (1) Standardized grading of music would be valuable. (2) Teachers spend too little time developing sight-reading ability. The author closes with the hope that the tests themselves will prove useful measures of achievement for the research worker and the cornet teacher. The bibliography quoted is a valuable addition to the little volume.

ABRAHAM PEPINSKY

Haverford College

New Books, Monographs, and Pamphlets

How to make progress in the armed forces. B. Balinsky and M. Blum. New York: Authentic Publications Company. 1943. Pp. 128. $1.00.

Toward community understanding. Gordon W. Blackwell. Washington, D. C.: Commission on Teacher Education. 1943. Pp. viii + 98. $.75.

Social psychology of modern life. Steuart H. Britt. New York: Farrar and Rinehart. 1943. Pp. 562. $3.75.

Personality and economic background. Helen H. Davidson. New York: King's Crown Press. 1943. Pp. x + 189. $2.25.

Rehabilitation of the war injured. William Brown Doherty and Dagobert D. Runes. New York: Philosophical Library. 1943. $10.00.

The structure of morale. MacCurdy. New York: The Macmillan Company. 1943. Pp. 221. $2.50.

Religious counseling of college students. Thornton W. Merriam. Washington, D. C.: American Council on Education. 1943. Pp. vii + 77.

Emotions and memory. David Rapaport. Baltimore: The Williams and Wilkins Company. 1942. Pp. ix + 282. $3.00.

The effect of the war emergency on selective elimination of students at the University of Oregon. Jean Riddell and Leona E. Tyler. Bureau of Personnel Research, Bulletin 21, University of Oregon. 1943. Pp. 3.

The encyclopaedia of modern education. Harry N. Rivlin and Herbert Schueler. New York: Philosophical Library. 1943. Pp. 800. $8.50.

Vocational interests of men and women. Edward K. Strong, Jr. Stanford University, California: Stanford University Press. 1943. Pp. 676. $6.50.

The relationship of high school grades to scholastic success at the University of Oregon. Leona E. Tyler. Bureau of Personnel Research, Bulletin 20, University of Oregon. 1942. Pp. 3.

Elementary statistical methods. Helen M. Walker. New York: Henry Holt and Company, Inc. 1943. Pp. xxv + 368. $2.75.

Encyclopedia of child guidance. Ralph B. Winn. New York: Philosophical Library. 1943. $7.50.

Annual report of the Psychological Corporation. New York, 1942. Pp. 20.

AMERICAN PSYCHOLOGICAL PERIODICALS

American Journal of Psychology—Ithaca, N. Y.; Cornell University. Subscription $6.50. 624 pages annually. Edited by K. M. Dallenbach, Madison Bentley, and E. G. Boring. Quarterly. General and experimental psychology. Founded 1887.

Journal of Genetic Psychology—Provincetown, Mass.; The Journal Press. Subscription $14.00 per annum (2 volumes). 1000 pages annually. Edited by Carl Murchison. Quarterly. Child behavior, animal behavior, and comparative psychology. Founded 1891.

Psychological Review—Northwestern University, Evanston, Illinois; American Psychological Association, Inc. Subscription $5.50. 540 pages annually. Edited by Herbert S. Langfeld. Bi-monthly. General psychology. Founded 1894.

Psychological Monographs—Northwestern University, Evanston, Illinois; American Psychological Association, Inc. Subscription $6.00 per volume. 500 pages. Edited by John F. Dashiell. Without fixed dates, each issue one or more researches. Founded 1895.

Psychological Bulletin—Northwestern University, Evanston, Illinois; American Psychological Association, Inc. Subscription $7.00. 665 pages annually. Edited by John E. Anderson. Monthly (10 numbers). Psychological literature. Founded 1904.

Archives of Psychology—New York, N. Y.; Columbia University. Subscription $6.00 per volume. 500 pages. Edited by R. S. Woodworth. Without fixed dates, each number a single experimental study. Founded 1906.

Journal of Abnormal and Social Psychology—Northwestern University, Evanston, Illinois; American Psychological Association, Inc. Subscription $5.00. 560 pages annually. Edited by Gordon W. Allport. Quarterly. Founded 1906.

Journal of Educational Psychology—Baltimore, Md.; Warwick & York. Subscription $6.00. 720 pages annually. Edited by J. W. Dunlap, P. M. Symonds, and H. E. Jones. Monthly except June to August. Founded 1910.

Psychoanalytic Review—New York, N. Y.; 64 West 56th St. Subscription $6.00. 500 pages annually. Edited by Smith Ely Jelliffe. Quarterly. Founded 1913.

Journal of Experimental Psychology—Northwestern University, Evanston, Illinois; American Psychological Association, Inc. Subscription $14.00 per annum (2 volumes). 1040 pages annually. Edited by Samuel W. Fernberger. Monthly. Founded 1916.

Journal of Applied Psychology—Northwestern University, Evanston, Illinois; American Psychological Association, Inc. Subscription $6.00. 480 pages annually. Edited by Donald G. Paterson. Bi-monthly. Founded 1917.

Journal of Comparative Psychology—Baltimore, Md.; Williams & Wilkins Co. Subscription $14.00 per annum (2 volumes). 1000 pages annually. Edited by Roy M. Dorcus, Knight Dunlap and Robert M. Yerkes. Bi-monthly. Founded 1921.

Comparative Psychology Monographs—Baltimore, Md.; Williams & Wilkins Co. Subscription $6.00 per volume. 400 pages. Edited by Roy M. Dorcus. Without fixed dates, each number a single research. Founded 1922.

Genetic Psychology Monographs—Provincetown, Mass.; The Journal Press. Subscription $7.00. 500 pages annually. Edited by Carl Murchison. Bi-monthly. Each number one complete research. Child behavior, animal behavior, and comparative psychology. Founded 1925.

Psychological Abstracts—Northwestern University, Evanston, Illinois; American Psychological Association, Inc. Subscription $7.00. 700 pages annually. Edited by Walter S. Hunter and H. L. Anabacher. Monthly. Abstracts of psychological literature. Founded 1927.

Journal of General Psychology—Provincetown, Mass.; The Journal Press. Subscription $14.00 per annum (2 volumes). 1000 pages annually. Edited by Carl Murchison. Quarterly. Experimental, theoretical, clinical, and historical psychology. Founded 1927.

Journal of Social Psychology—Provincetown, Mass.; The Journal Press. Subscription $7.00. 500 pages annually. Edited by John Dewey and Carl Murchison. Quarterly. Political, racial, and differential psychology. Founded 1929.

Psychoanalytic Quarterly—Albany, N. Y.; 372–374 Broadway. Subscription $6.00. 560 pages annually. Edited by Bertram D. Lewin and others. Quarterly. Founded 1932.

Character and Personality—Durham, N. C.; Duke University Press. Subscription $2.00. 360 pages annually. Edited by Karl Zener. Quarterly. Founded 1932.

Journal of Psychology—Provincetown, Mass.; The Journal Press. Subscription $14.00 per annum (2 volumes). 800–1200 pages annually. Edited by Carl Murchison. Quarterly. Founded 1935.

Psychometrika—University of Chicago, Chicago, Ill.; Psychometric Society. Subscription $10.00. 320 pages annually. Edited by L. L. Thurstone and others. Quarterly. Quantitative methods in psychology. Founded 1936.

Psychological Record—Bloomington, Ind.; Principia Press. Subscription $4.00. 500 pages annually. Edited by J. R. Kantor and C. M. Louttit. Without fixed dates, each number a single research. General psychology. Founded 1937.

Journal of Consulting Psychology—Lancaster, Penn.; Science Printing Co. Subscription $3.00. 240 pages annually. Edited by J. P. Symonds. Bi-monthly. Founded 1937.